

22 NOVEMBER 1988



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# JPRS Report—

## Science & Technology

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***USSR: Science &  
Technology Policy***

# Science & Technology

## USSR: Science & Technology Policy

JPRS-UST-88-013

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22 NOVEMBER 1988

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**Planning Effectiveness of S&T Progress**  
*18140012 Moscow PLANOVYE KHOZYAYSTVO  
in Russian No 7, Jul 88 pp 73-77*

[Article by Doctor of Economic Sciences M. Sidorov, deputy director of the Scientific Research Institute of Economics attached to the USSR State Planning Committee: "The Planning of the Effectiveness of Scientific and Technical Progress"]

[Text] The meeting of production and other needs and the increase of production volumes in case of limited manpower, material, and natural resources are possible only by means of new economical technologies. The increase of the technical and technological level of production also governs purely economic indicators—the growth rate of the national income and the profitability.

Scientific and technical progress as a factor of economic growth is becoming at the present stage not only the initial and most important phase of the reproduction of the social product, it also influences working conditions, the standard of living, the quality of life, and the balance of economic and ecological processes.

All this also predetermines the constant increase of the expenditures on scientific research. In 1985 they came to 24.8 billion rubles, by 1990 they will increase to 33 billion rubles. In their absolute amount the expenditures on science are comparable to the outlays on the development of a large sector of industry. Moreover, purely scientific research accounts, as a rule, for 5-10 percent of all the outlays on the introduction of a new product. The remainder is the spending on design and technological development, the production of machine tool attachments and new equipment, and the modernization of operating enterprises or the construction of new ones. If we assume that of all the expenditures on science only 10 billion rubles are used for the designing of new means of production, more than 100 billion rubles will be required for their introduction. But this is already such amounts, the effectiveness of which should be carefully measured and planned.

The quality of the planning of the economy as a whole and any sector of it is governed by the reliability of the data and the predictability of the economic results on the practical implementation of discoveries and inventions on the basis of the calculation of their national economic efficiency, on the planning of the scale of assimilation of new equipment and technology, and on the comparison of the anticipated results from the use of scientific and technical achievements with the expenditures. Such calculations should also be a component when making projections on the indicators of the reproduction of fixed capital, the effectiveness of capital investments, and the use of material resources.

The development of science and technology is of a random nature. The factor of uncertainty plays a large role here. However, this cannot serve as an argument in

favor of the fact that it is difficult to plan scientific and technical progress. It is impossible to use inflexibly the method of analogies with respect of different objects: basic research is one matter, the introduction and development of discoveries and inventions, which have already been made by science, are another.

In recent years the development of science and technology has been focused on the most important indicators. Among them are: the assignments on the production of prototypes and the first industrial series of equipment and materials of new generations, which implement developments of interbranch scientific technical complexes, academic scientific institutions, and higher educational institutions, as well as are being fulfilled within the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries to 2000; the series production of a new highly efficient product, which is planned as a component of state orders for the sectors of industry; the increase of the technical level and the updating of items, the increase of the share of the highest quality category and the most important types of products of the machine building complex, which correspond to the world technical level. The indicator, which characterizes the ratio of exportable items to the volume of their production, is also being used more and more often.

The analysis and planning of the economic impact from the implementation of scientific and technical measures are of fundamental importance. For industrial ministries it is recorded in the calculations on the decrease of the product cost due to the increase of the technical level of production. Thus, during 1986-1990 as a result of the implementation of scientific and technical measures in the area of the saving of resources the production cost of industrial items should decrease by 28.6 billion rubles as against 16.3 billion rubles during the 11th Five-Year Plan. The actual economic impact, which was obtained from the decrease of the production cost due to the introduction of measures of scientific and technical progress, as well as from the sale of new items in the form of incentive markups on the wholesale prices, acts as the basic source of the formation of the economic stimulation funds of scientific research, design, and technological organizations. The accuracy and validity of the planning calculations of the effectiveness of scientific and technical progress and the connection of the indicators of the impact with the cost accounting indicators of the activity of enterprises and associations (first of all with the production cost and the profit) are the most important factors of the speeding up of the use of the achievements of science and technology in all sectors of the national economy.

Under the conditions of the more rapid updating of the range of output being produced and the development of equipment of new generations the importance of the pilot experimental base is increasing substantially. However, enterprises are rarely forced to bring new equipment up to the necessary parameters at an operating

works, hence the increase of the expenditures on the assimilation of a new product, its low quality, and the lengthy period of the implementation of scientific results.

During the current five-year plan the situation is changing. The capital investments in the development of pilot experimental works come according to the plan to not less than a half of the total assets that are being allocated for the construction of facilities of science. The share of capital investments for the development of the experimental base of machine building is being increased to not less than 8 percent of their sectorial amount as against 1 percent during the 11th Five-Year Plan.

Scientific and technical progress requires the observance of specific proportions between the expenditures on science, education, and the development of new equipment and the total amount of capital investments. The lower the ratio of the expenditures on education to the spending on scientific research is, the fewer opportunities there are for the mass dissemination of new knowledge and, consequently, its materialization. On the other hand, the increase of the level of education should be backed by the increase of the technical level of fixed capital. If the growth rate of capital investments leads substantially the dynamics of the expenditures on the development of science and education, a gap appears between the increasing volume of output and its technical level. The development of science and education does not properly influence their materialized embodiment.

Therefore, the search for sound ratios between the indicated expenditures should become a component of the concept of the comprehensive planning of scientific and technical progress. But it is wrong to think that it is easy to realize it in practice by having used such indicators of scientific and technical progress, which are represented in all or the majority of the sections of the national economic plan. The experience of the last 2 decades made it possible to be convinced that the change of both the number and the type of approved indicators had a weak influence on real economic processes.

Of course, any extreme point of view hyperbolizes one aspect of the phenomenon. Since the system of plan indicators is the basic means of interaction of central economic departments with sectors and enterprises, the improvement of centralized planning presumes the perfection of this system. It is another matter that this is one of the questions. And it should be settled in the process of changing over to economic methods of management. As soon as an economic interest in the updating of the range of output being produced, the increase of its quality, and the rapid use of scientific and technical achievements arises for enterprises and sectors, the unwieldy systems of plan indicators, which reflect with one degree of completeness or another such a multidimensional phenomenon as scientific and technical progress, will disappear of themselves. The detailed analysis of economic processes requires the use of all the

diversity of indicators. The planning of these processes should envisage the efficient functioning of production units, when central departments by means of a limited set of long-term standards influence the economic interests of enterprises and establish strict responsibility for the results of production first of all from the standpoint of efficiency and the meeting of needs.

Scientific and technical progress, however great its significance, is a factor of production. It creates the basis for the more economical conversion of source objects of labor into finished output, the volume of which increases, while the assortment becomes more and more diverse. But here a question may arise: Is it necessary at the national economic level in general to view scientific and technical progress as an independent object of planning? The orientation in planning toward the end results, it would seem, makes such a statement of the question legitimate. Moreover, in the end scientific and technical progress is materialized in the improvement of the quality of all the elements of productive forces, and since they are an object of planning, thereby the planning of scientific and technical progress is also necessary. For this the process of planning should be depicted, first, not only as a method of determining the goals and end results of planning, but also as a search for means of their achievement and, second, not so much at the level of production as from the standpoint of the continuously updated reproduction of the social product, when the factors and results of production turn into each other (for example, the consumption fund is not only a result of production, but also a factor of the reproduction of manpower resources; discoveries and inventions are a product of the development of science and at the same time a factor of the efficiency of the reproduction of fixed capital and material resources).

Scientific and technical progress is being interwoven into the fabric of national economic reproduction processes, the possibility of the realization of which is being predetermined to a greater and greater degree by the development of science and technology and by the use of their results. Thus, economic demands on scientific and technical progress are objectively arising. At present they are established at the stage of the formulation of the Comprehensive Program of Scientific and Technical Progress for the Future Period of 20 Years. The special-purpose forecasting of the growth rate of the national income, which is necessary for the solution of social problems, is based on the specification of the demands on the effectiveness of scientific and technical progress. The increase of the efficiency of new equipment and technology, which makes it possible to ensure the set rate of increase of the national income, is determined through the estimation of the share of new types of products in the volume of the social product, the scale of their introduction in the process of capital construction and the renovation of operating enterprises, as well as with allowance made for the possible amounts of the increase of manpower resources, capital investments, and fuel, energy, and mineral raw material resources.

The planning of the basic indicators of the economic and social development of the country on the basis of generalizing characteristics of scientific and technical progress and the inclusion of the latter in the system of planning calculations, in spite of obvious necessity, remain for the present an open problem, although in practice and in theory approaches to its solution have been outlined. Such indicators as the relative decrease of the number of workers due to the increase of the technical level of production, the absolute release of workers, who are engaged in manual labor, the saving of the most important types of material resources from the introduction of measures of scientific and technical progress, and the saving from the decrease of the production cost of industrial output due to the increase of its technical level are specified in the plans.

These calculations are made on the basis of the information of enterprises and sectors, but the latter, as a rule, do not have accurate data on the deliveries during the planning period of new types of equipment and machines and their actual efficiency. Therefore, many calculations for the future are of a conditional nature. Moreover, they are based on the possibility of determining the effect of one of the factors on the level and dynamics of the indicators, which are under the influence of a large number of factors. For example, it is possible to evaluate the influence of scientific and technical progress on the dynamics of the production cost, having assumed that the structure of production remains unchanged, the additional expenditures, which are connected with the increase of product quality, are eliminated, and the introduction of the new principles of the remuneration of labor did not affect its productivity. In reality a number of factors, the intensity of which also changes, influence the overall result.

The solution is either to learn to weigh the effect of each significant factor on the resulting indicator or to analyze and plan the interrelations of the indicators of the same level of aggregation, assuming that precisely these interrelations are of a decisive nature. In theoretical research they are proceeding in this direction. The influence of scientific and technical progress on the growth of the national income is determined by the difference between the growth rate of the latter and the growth rates of the number of people employed and the fixed capital, multiplied by the corresponding coefficients of elasticity. Various modifications of production functions and methods, which follow from them, of calculations of the effect of scientific and technical progress on economic growth have been proposed. The estimates, as a rule, differ substantially and, what is the main thing, cannot be a tool of the planning of scientific and technical progress. Planning practice does not use this method not only because it is impossible to apply it in the present technology of planning, but mainly due to the impossibility of combining the results of the calculations with respect to production functions with the formulation of the economic demands on scientific and technical progress and converting them into the form of plan indicators.

Alternative approaches, but ones that do not lose the basic idea of the production function—the analysis of the interrelation of the expenditures and the results of production—are needed. It is a question of the development of such methods of planning calculations of national economic indicators, which make it possible to purposefully influence investment and structural policy with allowance made for the factor of scientific and technical progress. Let us examine one of the approaches.

A characteristic feature of the present process of reproduction is the more rapid replacement of fixed capital on a new scientific and technical basis. But in order to obtain a high impact (from the standpoint of both the speeding up of the dynamics of the national income and resource conservation), the technical and economic parameters of new types of machines and equipment should be significantly better than those of the types being replaced, which is an important prerequisite of expanded reproduction and the increase of the share of the consumption fund in the national income.

The accomplishment of these conditions is possible, if the specific economic demands on the effectiveness of scientific and technical progress, moreover, as applied not only to individual types of machines, but also to the aggregate of the fix capital being introduced, will be specified. At the microlevel the basic reason is that not the technological and design solutions when developing new equipment would predetermine the level of expenditures on its production and operation, but, on the contrary, the maximum level of the production costs and operating expenses per unit of basic technical and economic characteristics would become the standard when seeking the most economical design and technological solutions. At the macrolevel it is important to take into account that during each period a portion of the output is produced by means of traditional and new fixed capital. But the latter is also dissimilar in technical level and is introduced continuously, and in its very introduction, which is envisaged over a quite long interval of time, the replacement of obsolete means of labor by new means takes place.

For the specification of the demands on scientific and technical progress when planning the expenditures and results of social production it is important to divide the social product and the national income into the portion of the gross and especially the net output, which is produced by means of traditional fixed capital, and the portion, which is produced on introduced fixed capital during the period in question. When planning the national income for the intermediate- and long-term future the use of these indicators makes it possible to specify the demands on the effectiveness of scientific and technical progress, which is materialized in fixed production capital, on the basis of the assurance of the necessary dynamics of a number of most important national economic indicators.

From the standpoint of the increase of the output-capital ratio by the improvement of the use of material resources the types of new equipment, which are used at the meeting point of the extractive and processing sectors and promote the more thorough and complete processing of natural resources, are of the greatest importance. The increase of the current and one-time expenditures in the extractive sectors, which is connected with the deterioration of the natural conditions of extraction, can be offset by the increase of the processing capacity of machines and equipment at the first basic stages of the processing of natural resources, when it is necessary to obtain from them an increasing and diverse amount of objects of labor.

A necessary condition of the economic advisability of expenditures on scientific and technical progress, including on the production of new means of production, is their recovery. A fundamentally new means can be developed only at the expense of the net income. The expenditures, which will be included in the production cost of a new means of labor, are recovered by the net income that has been created at present.

If an enterprise acquires new machines (at the expense of the production development fund), it should also have confidence that they will provide a profit that is not less than the expenditures on their purchase. A forecast of the volumes of the marketing of the product, which is produced by means of the new machines, and of the price, at which it will be sold, is needed for this. Inasmuch as means of labor serve for a number of years, the calculations of the efficiency of the production and use of machines cannot be based on the annual reproduction cycle. The use of means of production, which operate a long time, was the first objective condition of the necessity of the long-range planning of the development of sectors and the national economy.

The indicators of the expenditures and the results of production and their dynamics depend on the level of the design and technological solutions and the degree of the implementation on the scale of the national economy of promising scientific ideas. Here first of all what is meant is the effectiveness of the prices for new types of machines and equipment. They are determined on the basis of so-called limit prices. The latter are calculated as the sum of the standard production cost and the standard profit. The standard production cost is calculated according to the technical norms of material and labor expenditures. The norms are established by the sectors that are the producers of the new equipment, often they are established with a large allowance so that the enterprises in the next few years could fulfill the assignments on the decrease of the labor intensiveness and the production cost of the output being produced. Inspecting organs far from always can effectively check the progressiveness of the standards due to the enormous amount of information and a number of conventionalities when calculating the expenditures, especially in multiple-product industries.

The consumer, when acquiring new equipment, includes the amortization deductions and the operating expenses in the production cost of the output being produced. He very often does not have the right to reject expensive new equipment, he does not have in practice the opportunity to choose the producers of new machines. Under the conditions of the substantial exceeding of the need for new equipment as compared with the volumes of its production the economic criteria recede into the background.

Moreover, the producers, when designing new equipment, strive to overstate the standards of the expenditures on its production when formulating the technological norms of labor and material expenditures. When calculating the norms, they base themselves on the equipment and technologies, which are present at the given enterprise. The output of new equipment requires advanced technologies and equipment and the better organization and standards of production. The cause becomes the consequence, and vice versa. The solution consists in the rapid expansion of wholesale trade in means of production, in the possibility of materializing the production development fund of enterprises, and in the active influence of the users of new equipment on its producers.

The present practice of the pricing of new equipment also includes in its arsenal the calculations of its economic efficiency in the sphere of consumption. This is done for the ascertainment of the economic advisability of its production and the establishment of the limit of the increase of prices with allowance made for the efficiency. Let us examine several fundamental features of the determination of the impact from new equipment. The calculation is based on the comparison of the adjusted expenditures for the new and base versions and has as its goal to prove the economic advisability of its production in place of the equipment being used in the national economy. Meanwhile the comparison of the adjusted expenditures, for example, with respect to different versions of the construction of the same project is made back at the stage of designing.

These are different economic situations, consequently, it is illegitimate to use the same procedural technique. Here the price of the machine being produced serves as the base for the calculation of the impact and the price of a new machine, therefore, scientific and design organizations and producer enterprises are not aimed at the development of such designs, which would provide a decrease of not only the operating expenses, but also the one-time expenditures (in this case the cost of the production of new equipment).

In the formula of the adjusted expenditures the current costs are normalized with the one-time costs by means of the standard coefficient of elasticity. The amount of the impact is not calculated, but as if is ascribed to the new type of equipment. Is it possible to assert that precisely such an amount of the impact will be realized during the

year in question? Obviously, it is not. Therefore, the difference of the adjusted expenditures, which contains along with the real saving the conditional saving, distorts the principle of the establishment of the economic impact, which is based on the comparison of the actual expenditures and results during a specific interval of time. The formula of the adjusted expenditures makes it possible to reduce to a comparable form the capital and current investments, but for the process of reproduction and for the calculations of efficiency this is not the same thing.

It is important to bear in mind that the saving on current expenses only after the passage of a number of years covers the higher capital expenditures of the chosen version. Consequently, the excessive increase of the role of such a saving when substantiating the efficiency of new implements of labor leads to an increase of the capital intensiveness. Especially as the calculations are made at the macrolevel and, as a rule, are not linked with the total amount of capital investments both with respect to the national economy as a whole and with respect to its sectors.

The saving of current expenditures for the user of new equipment can change substantially in the process of the series production of new equipment and the improvement of its design. It depends on the level of its utilization and the sphere and conditions of operation. Therefore, the enterprises, which are the producers of new equipment, can show large amounts of the estimated saving of current expenditures as a result of its introduction, while planning organs, without having information on the conditions of operation, do not have the opportunity to verify the correctness of their calculations.

However, against this "saving" enterprises can demand additional capital investments, which it is necessary to allocate to them already today. On the basis of the estimated impact and prices technical policy is formulated, in particular, the economic advisability of changing over to a new model of equipment is substantiated. Consequently, the developers of equipment, who have been placed under more exacting conditions with respect to the achievement of the necessary amount of the consumer impact, will be forced to develop a technically more advanced model of a machine than they are now doing, when the practice of calculations of efficiency make it possible to prove the economic advantages of an inadequately developed and imperfect design. As a result modernized old equipment, which usually has a significantly higher price in order to be considered new, is often produced under the guise of new equipment. The consequences of this are well known—the increase of labor productivity in the sectors, which are the users of machine building products, slows, the output-capital ratio decreases, while the expenditures of society on the assimilation of a "new" product in machine building still increase.

In our opinion, it would be advisable to calculate the impact from new equipment by comparing the increase of the net income of the user enterprises during the entire period of operation with the expenditures on production. This is a real cost accounting indicator, which characterizes the increase of the results of production as compared with the expenditures. It includes the impact both from the increase of its productivity and the production volumes and from the decrease of operating costs. In this case not the improvement of some individual technical parameter, but the increase of the economic impact for users will be the basic criterion of the advisability of the production of a new machine.

The ratio of the expenditures on the production of new equipment and the annual increase of the net income in the sphere of consumption characterizes the period of the recovery of one-time expenditures. If it exceeds the standard period, it is necessary to decrease the production costs and to increase the growth of the net income in the sphere of consumption. This is also a specific assignment for designers and process engineers, who design new equipment, as well as the realization of the economic demands on scientific and technical progress.

Enterprises themselves can determine the necessity of acquiring individual types of equipment. The economic advisability of producing new systems of machines and advanced technologies, which substantially increase the efficiency of social production and have a broad scale of application in many sectors of the economy, should be determined at the national economic level.

The real economic impact from new equipment must be clearly recorded at the level of the primary accounting of the expenditures and results, in the accounting and financial statements of enterprises.

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#### Academician Ivanov on Determining R&D Priority Projects

Moscow NTR: PROBLEMY I RESHENIYA in Russian  
No 16, 16 Aug-5 Sep 88 p 5

[Interview with Academician Mikhail Vladimirovich Ivanov by NTR correspondent A. Lepikhov: "Academic Science Through the Eyes of an Academician"]

[Text][Question] Mikhail Vladimirovich! We are now discussing the need of concentrating the efforts of researchers on the most important priority directions of research. Yet nature is one and, if we can put it that way, everything in it is of the same importance. How does the actual term "priority direction" arise? Or, possibly, someone has "designated" it?

[Answer] But why do you demonstrate your antipathy to the scientific bureaucracy so abruptly? It in the given case here has nothing to do with it. Priority directions are an objective reality. But there are several sources to this reality.

First of all, priority directions are formed quite often at the conflux of various sciences.

The second way of creating priority directions is connected in my opinion with the emergence of new methods of research.

And, finally, another means of creating priority directions of research is what we crudely call "practical importance."

[Question] Let us then look from the positions you have mentioned at the development of priority directions in biology....

[Answer] I want to say at the outset that I cannot assume the boldness of an expert for all biology. I shall deal with two directions—molecular biology and the related to it so-called modern biotechnology as well as ecological problems. If we were to compare these two priority fields of biology in the last 10-15 years, they would be seen to have developed extremely unevenly. During this period very large material, including monetary, resources were invested in molecular biology and biotechnology. Ecological research was, putting it crudely, totally neglected. I want to specify that in speaking of ecology I have in mind the basic problems of this science and not engineering technical developments relating to protection of the environment from pollution. True, we have nothing here to boast about, but this, however, is not a scientific but an engineering technical problem which has not been solved because of the extreme paucity of allocated funds.

The attention to molecular biology is quite explainable. It in principle will help us in its further development to transform biology from its today's rather descriptive stage into a precise science. The birth of contemporary biotechnology is natural as a legitimate desire of researchers to transform theoretical achievements into methods of producing various products and drugs in acutely short supply.

But while molecular biologists were penetrating the secrets of living cells, it thundered and a marked deterioration ensued of the properties of free air, drinking and sea water and recreational areas. In the West, they have duly reacted to this and released large financial resources for investigation of the fundamental problems of ecology. In our case, there has been no reaction so far to the ills of nature which arise from civilization's development.

[Question] Why?

[Answer] There are several reasons for this. First of all, remote consequences of the Lysenko phenomenon making their impact.

[Question] But more than a single decade has passed since T.D. Lysenko's death.

[Answer] Open up the directory of the All-Union Academy of Agricultural Sciences and look at its list of personnel. A significant portion of the members of this academy are actual pupils of Trofim Denisovich or students of his closest "scientific entourage."

Second, practically no funds were left for the development of the fundamental problems of ecology. These went into molecular biology and biotechnology. I think that a share of this blame for the created situation belongs to the ecologists themselves. Their arsenal contained outstanding works on the ecology of individual species of animals, but research on complex natural systems was practically absent. I am not even speaking of the fact that such works require very large statistics, expensive automated equipment for measuring a number of parameters of the environment.

[Question] But cannot the network of the State Committee for Hydrometeorology and Environmental Control be used for these purposes?

[Answer] Actually, it is the first thing that comes to mind. Corresponding member of the USSR Academy of Sciences Yu.A. Izrael, who heads this state service, has a colossal network of hydrometeorological stations and measuring locations. But they are equipped with such primitive equipment that to speak of their use for scientific purposes would be possible only after complete technical reequipment. I think that you will not be surprised if I add that modern equipment for automated monitoring of the environment is practically not produced in our country.

But, as they say, the further you go into a forest, the more timber you find. It turns out that even this information, which is at the disposal of the State Committee for Hydrometeorology and Environmental Control, practically cannot be utilized by a researcher. I will cite an example from my own practice. When I together with my colleague was working on the book "Globalnyy biogeokhimicheskiy tsikl sery" [The Global Biogeochemical Cycle of Sulfur], I turned to the State Committee for Hydrometeorology and Environmental Control. The point is that personnel at observation points have been for many years in a row (several times a month) conducting a six-component analysis of water, including for sulfur. The results of these measurements are issued monthly but... with the stamp "For Official Use." I was obliged to do without an analysis of these data and to make use of Alekhin's and Brazhnikova's work "Ionnyy stok" [Ion Discharge]. This book, which is referred to throughout the entire world, was published... in 1964, when sulfur measurement results were still open. You

know that I still find it difficult to understand the logic of scientific bureaucrats who in our time of reconnaissance sputniks pretend that this or that metallurgical combine does not exist. And they quite probably can be seen even from Mars.

[Question] You head the academic institute of microbiology, the topics of whose research also belong to those enjoying priority. What is the state of affairs in your own bailiwick?

[Answer] I shall begin by saying that in this case it is simply impossible to speak of my "own bailiwick." The fact is that a research institute requires specially built quarters. And we have been staying, moreover since 1962, in an ordinary regular school building. We happened to get it because the architects managed to "place" this building in a microrayon of Moscow where there are simply no children. Probably far from everyone knows that for almost one-fourth of a century a prohibition has been in effect on the construction of buildings for academic scientific-research institutes. And those which still somehow manage to be built happen only as an exception, thanks to the incredible ingenuity and go-getting energy of their directors. Nonetheless biologists, for example, can boast at this time of only one new building for the Institute of Bioorganic Chemistry. Tremendous funds were expended on it, and this became possibly solely because the now deceased academy's vice president Yu.A. Ovchinnikov forced a way through for its construction.

In our institute every staff member has less than 6 square meters of production space (under the sanitary norm, it should be twice as large). But we are not in the worst possible situation. Our colleagues and staff members of the Institute of Evolutionary Morphology and Ecology of Animals, "live" in 17 basements located in the most diverse localities of Moscow.

[Question] What equipment is your institute fitted out with?

[Answer] I shall not enumerate everything that we do not have. I shall only say one thing. When foreign scientists visit the institute, I try not to guide them through the laboratories so as not to demonstrate to them one more time our crippled condition. I invite our staff members to the director's office who tell their foreign colleagues about the work being performed.

With respect to the level of performed work, the situation is as follows. Let us say that in such a field as systematics of microorganisms we are at a perfectly respectable level. Here we have stable scientific traditions and fully qualified people work. But... a small and subtle point—in analysis of the diversity of the world of microbes, there is no need for any complex equipment.

Work is not doing badly among us in marine and geological microbiology. Here we have many original works whose priority is recognized throughout the entire world.

The situation is worse in the case of cytology where it is impossible to work without modern, quite expensive electron microscopes. For 20 years we had been using old Japanese ones until we recently became the possessors of two modern electron microscopes which were produced as you might guess not in our country.

And a very sombre situation has come to exist in the field of physiology and biochemistry of microorganisms. This work cannot be carried out without modern research reagents. We simply do not have an industry of scientific reagents in our country. As for the chemical monsters—these tremendous plants and combines—they put out thousands and millions of tons of products, but products of an extremely narrow spectrum and of very low quality. These reagents are not suitable for research work, they must be additionally purified. And to oblige industry to produce that which only scientists need is impossible, as it would be unprofitable for them to do this, the volume being too small. Consequently, in order somehow to extricate themselves, a number of academic institutes are engaged in a perfectly uncharacteristic work—synthesis of research reagents.

[Question] In microbiology as incidentally in any other field of science, it is probably impossible to operate at the world level without holding one's hand on the pulse of modern scientific and technical information.

[Answer] I shall begin with the fact that new information today is not contained by any means in our scientific journals—where "new" information is published in them at best a year to a year and a half from the time of inception. New developments are discussed by researchers at international conferences, especially at symposiums dealing with narrow microbiological problems. But in order to know about them, it is naturally necessary to be present.

And in order to attend such a symposium, it is necessary to make one's way each time through the "thorny path" of registering for an exit trip. First of all, an instruction of many years' standing exists which states that any academic delegation in principle cannot exceed 16 persons.

Furthermore, there are so-called "limits on countries" which in now case can be exceeded. In addition, a scientist must "mature" for participating in a symposium taking place, let us say, in the Federal Republic of Germany or the United States. This means first to visit a socialist country as a tourist, then to go abroad as part of a delegation and only after that to aspire to a trip to a capitalist country. Indeed, the actual process of registering for a trip abroad is so lengthy that we frequently are unable to arrive on time at the symposium we want. And

for this reason, here I disclose a little secret—we say to our foreign colleagues: if you would like me to come to your conference, let me know of this at least six months ahead of time, even if at that time you do not know where this conference will take place, when it will open and even if it will be held at all.

As the result of such a procedure of registering for foreign trips based on a total lack of trust in the individual, people for the most part on the verge of pension age go to international scientific events. And it should be first of all not us academicians but young scientific colleagues and graduate students.

And, of course, at any representative scientific conference, a comparison of the size of scientific delegations is devastating. For large congresses, usually 400-500 persons come from the United States and Japan, 200-300 from the Federal Republic of Germany; delegations from France and Italy are quite impressive, but only we, representatives of a country where the largest in the world microbiological industry has been created, show up as a "shock detachment" of 3-5 persons.

All this results in the fact that we Soviet scientists are simply not known in the world. The last microbiological congress, if my memory does not fail me, took place in 1985. Shortly prior to it, I received a circular listing the chairmen of sections and their deputies, heads of "round tables" and people requested to present reports. All of them were well-known scientists. Thus among 365 names only three belonged to Soviet researchers.

Let me add that although many of our scientific journals are translated into the English language, they are practically unread because today the Western investigator has no need for information that is 2 years old. Furthermore, we do not have any access to world data banks—the academy's Institute of Microbiology does not have a single computer.

This is in general terms is the state today of data base organization and support for one of the priority directions of biological research.

[Question] Which of the problems that you have talked about do you consider to be the most important?

[Answer] There is no doubt that we need modern facilities for research institutes and the latest equipment, reagents and data base organization and support. All this is a fact. But the main problem I think is something else. It is training cadres of young researchers. A vital organic link between the academy and universities was broken many years ago by a solitary bureaucratic act—prohibition of holding two or more jobs at a time. And only most recently the academy's staff personnel were again forbidden to work even in VUZ's. It is necessary to involve specialists on a broader scale in giving specialized courses at higher educational institutions, to take part in the fulfillment of the course and graduation work

of students at academic institutes and to introduce young students to real research work as early as in the second- and third-year courses. And in actual higher school, to sharply reduce the teaching load of professors and docents (today it is six- to eightfold greater than at foreign universities) so that they too would have an opportunity for independent research work.

Such a movement of higher school and the academy closer toward each other and ultimately toward their "amalgamation" could, in my opinion, lead to the formation of a new generation of microbiologist researchers who in the course of 5-10 years would occupy leading positions in its highest priority directions.

The basis of their material support should be, naturally with maximum publicity, revision of the already existing scientific priorities and the forming of such scientific programs without whose fulfillment Soviet science in truth could not develop. I am convinced that even those small funds that are allocated by the state to our academy could be distributed more rationally.

#### Resource Problems Hamper Collective's Effectiveness

18140023 Moscow EKONOMICHESKAYA GAZETA  
in Russian No 32, Aug 88 p 16

[Article by V. Lazarev, director of the Odessa Center of the Maintenance of NC Metal Removal Machine Tools, under the rubric "A Reader Continues the Discussion" (Odessa): "So That They Would Not Take by Surprise..."]

[Text] The questions, which were raised in the article "Who Will Help the Center" (No 12), are close and comprehensible to the collective of the Odessa Center of the Maintenance of NC Metal Removal Machine Tools (OTsTO). Our center, in essence, was the first in the country. The future of machine tool service was developed at it as on a model. Just 3 years later the decision on the establishment of another 25 such centers was made.

In practice we had to grasp everything by means of experiment. While great tasks were specified: to perform start-up and adjustment work, to carry out the maintenance and repair of NC machine tools and the development and introduction of control programs, to give procedural assistance to plants in the organization of the efficient use of advanced equipment, and to train operators for it.

At present a comparatively small collective of adjusters annually starts up about 600 NC machine tools and robotic complexes and supports the operation of 400 machine tools. We are ready to give assistance to any plant that appeals to us. However, unfortunately, the majority of questions, on which the efficiency of our work at the client's depends, are not being settled at all or

are being settled extremely slowly. Already today we are lagging behind the requests of enterprises for services, while tomorrow the state of affairs may worsen even more.

The task of increasing in the immediate future the amount of work by two- to threefold and of expanding the training of specialists faces us. We have reserves, and we will do everything to use them. But we need the assistance of the USSR Ministry of the Machine Tool and Tool Building Industry. First of all it is necessary to increase the standard of working capital in order to provide the adjustment personnel with a supply of boards, tools, and attachments. According to our calculations, it should constitute up to 40 percent of the volume being performed by us. The settlement of this question alone would make it possible with the same collective to start up twofold more machine tools and robotic complexes and to carry out warranty repair and maintenance more efficiently. The standard was established for us 4 years ago, when the center was starting up one-third as many machine tools.

The reliability of the equipment being produced by industry is still low. This makes it incumbent to keep in warranty operations up to 20 percent of the adjustment personnel of the center. The expenditures on such operations are not reimbursed to the collective and fail to the production cost. Here it would be possible to use the experience of enterprises of the Ministry of the Radio Industry. They transfer a specific percentage from the cost of the started equipment in a planned manner to the current account of the organization that maintains this equipment. The assets are used for the financing of warranty operations. The method, which our ministry suggested to us, does not suit the center. For example, the Krasnyy proletariy Machine Tool Building Production Association is finding a large number of reasons not to pay the warranty costs.

The question of expanding the center is not being settled. In 1979 the Odessa City Soviet allocated a parcel of land. On it 48 families lived in ramshackle structures. However, their moving out dragged out to 1986. As a result the term of effect of the passport of the parcel of land expired not through our fault. The center addressed to the Main Architectural Planning Administration, and then the city soviet the request to extend the deadline of the use of the site. But it was turned down.

And, finally, there is the question of training personnel for work on new equipment. It is no secret that now technical innovations often take everyone at the enterprise by surprise—both the worker and the director. Advanced equipment is idle due to the lack of skilled personnel. A decree of the party and government was adopted in order to solve this problem. But difficulties analogous to those described in the article "Who Will Help the Center" were encountered already at the initial stage of the work on its implementation. Thus, of the previously promised amount of the wage in conformity

with the structure of the educational center they allocated only a third of it. This year the center has to obtain and install equipment worth 200,000 rubles for the conducting of practical lessons. Now due to the lack of assets the staff, which is small as it is, has to be reduced to one-third to one-half.

All the obstacles can be eliminated only if the previously adopted decisions are conscientiously fulfilled.

#### Elections Highlight Shortcomings of Inventors' Society

18140031 Moscow IZOBRETATEL I  
RATSIONALIZATOR in Russian No 7, Jul 88 pp 4-7

[Abridged version" of speech of Ye. I. Tyurin, chairman of the Central Council of the All-Union Society of Inventors and Efficiency Experts, at the 7th Congress of the All-Union Society of Inventors and Efficiency Experts on 14 April 1988: "The Consciousness of Responsibility for Restructuring. An Account of the Accountability Report of Ye. I. Tyurin, Chairman of the Central Council of the All-Union Society of Inventors and Efficiency Experts"; first three paragraphs are IZOBRETATEL I RATSIONALIZATOR introduction]

[Text] The 7th Congress of the All-Union Society of Inventors and Efficiency Experts was held in Moscow, in the Great Kremlin Palace from 14 to 16 April 1988. Ye.I. Tyurin, chairman of the Central Council of the All-Union Society of Inventors and Efficiency Experts delivered the accountability report. The report of the Central Auditing Commission of the All-Union Society of Inventors and Efficiency Experts, which A.M. Zhiudko delivered, was then heard. In the discussion on the accountability report and the report of the Auditing Commission 54 people spoke.

Foreign guests from the socialist countries, Finland, and Sweden and representatives of international organizations greeted the congress participants.

The congress delegates approved the report of the Auditing Commission and adopted a resolution on the accountability report of the Central Council of the All-Union Society of Inventors and Efficiency Experts. At the congress a new version of the charter of the All-Union Society of Inventors and Efficiency Experts was also adopted and the Central Council and the Central Auditing Commission of the All-Union Society of Inventors and Efficiency Experts were elected.

The results of the campaign to hear reports and hold elections, the speaker said, confirmed the necessary of profound changes in the activity of the All-Union Society of Inventors and Efficiency Experts. Today the return of creative technical activity from our public organization, which is the largest in the country, does not conform to its possibilities.

The style and methods of our work do not yet meet the requirements of the times and to a significant degree duplicate the activity of state and economic organs.

The development of the creative scientific and technical work of the working people and the future of the All-Union Society of Inventors and Efficiency Experts in many respects depend on how promptly the councils of our society will be able to find and to give life to new advanced forms of work, which meet the statewide, collective, and personal interests of inventors and efficiency experts.

Today it is necessary to comprehend in depth and thoroughly the changes taking place in the country and their influence on the practice of invention and efficiency promotion and on this basis to determine the role and place of the All-Union Society of Inventors and Efficiency Experts at the present stage of the modernization of Soviet society.

Our congress, Ye.I. Tyurin noted, will achieve its goal, if we analyze frankly and in a self-critical manner the results of the work of the society, evaluate the progress of the structuring, which is taking place in the All-Union Society of Inventors and Efficiency Experts, and specify its subsequent results.

From whatever standpoint we approach the specification of the subsequent directions of our development, we should not forget the main purpose of our public organization—to increase the contribution of every inventor and efficiency expert to the development of the economy and the improvement of production management and to promote in every way the identification of the talents, abilities, and creative inventiveness of the Soviet people and the increase of their intellectual level and the growth of self-consciousness.

In the 30 years of its existence the All-Union Society of Inventors and Efficiency Experts has developed into the most massive technical organization of the country, which has in its ranks more than 14 million people, of whom the leading portion of the working class makes up a half.

During the period under review the saving, which was obtained in the national economy from the use of technical innovations that were developed by inventors and efficiency experts, came to 38.7 billion rubles. In all in 5 years 119,000 inventions were introduced, which is appreciably more than during the past period under review. The creative activity of inventors and efficiency experts is providing in the national economy of the country a significant portion of the increase of labor productivity and a saving of material, fuel, and energy resources.

The preparation of a worthy greeting of the 19th All-Union Party Conference is causing a great upswing of creative activity. In honor of this significant event the

inventors and efficiency experts of many labor collectives have undertaken to fulfill ahead of time the socialist obligations of 3 years of the five-year plan, which were assumed by them.

For example, the inventors and efficiency experts of the Rostov Chemical Production Association imeni Oktjabrskoy revolyutsii, the Novocherkassk Electric Locomotive Building Plant, the Orsha Locomotive Barn, the Voroshilovgrad Pipe Plant, the Gorkiy Avtovigatel Production Association, and others have decided to operate during the day of the opening of the All-Union Party Conference on the resources that have been saved due to the introduction of technical innovations. Many inventors have decided in honor of this date to transfer their inventor's reward to the Peace Fund and the Soviet Children's Fund imeni V.I. Lenin.

While appreciating what has been achieved, we see that in recent times negative trends have been especially noticeable in the work of inventors and efficiency experts.

An appreciable loss of the prestige of creative inventing and efficiency work has occurred among workers, engineering and technical personnel, and scientists. Not more than 4 percent of the working people, who are employed in the national economy, annually participate in it.

Since the end of the 1970's the number of authors among engineering and technical personnel, specialists, and scientists has practically not increased in the country.

This had the result that our country in the specific indicators per 1,000 people gave up first place in inventing activity to other countries, including Czechoslovakia and the GDR, and now holds only sixth place in the world.

The share of highly effective inventions, which afford fundamentally new technical possibilities, is negligible. Their share does not exceed 1.5 percent. Few inventions, which ensure a breakthrough to qualitatively new technologies, are being developed (only 0.3 percent).

The distressing fact that new domestic equipment in the majority of cases, as before, is not competitive abroad, is a direct consequence of such a situation. With respect to the machine building complex, for example, in which first of all the world level should be ensured, the number of objects of new equipment, which is based on inventions, thus far comes to less than a half.

Appreciable changes are not occurring in the time and scale of the use of technical innovations. The decrease of the average annual rate of inventions, which have been introduced for the first time in the country, with respect

to the machine building, fuel and power, and construction complexes is causing alarm. The time of the use of inventions comes on the average to 7-9 years. An overwhelming portion (90 percent) of the inventions are used at only one enterprise.

As before, the situation with the use of the creative potential of innovators in the system of the agroindustrial complex is poor.

In the countryside there is practically no one to register the proposals of innovators. And such a situation has been going on for more than 10 years. The numerous appeals of the Central Council of the All-Union Society of Inventors and Efficiency Experts to the management of the USSR State Agroindustrial Committee thus far are being ignored. Apparently, in this department the questions of the development of creative activity and invention in the countryside, which were spoken about so vividly at the All-Union Congress of Kolkhoz Farmers, are considered a secondary matter.

The basic causes of such a attitude toward the proposals of innovators consist, in our opinion, in the inadequate influence of the economic mechanism on the acceleration of scientific and technical progress and in the poor receptivity of the national economy to the use of technical innovations, which was spoken about in the Political Report of the CPSU Central Committee to the 27th Party Congress and at the June (1987) CPSU Central Committee Plenum.

Interdepartmental barriers and the stand of a number of scientific and planning and design organizations and their managers, who unconditionally reject effective inventions which originate outside the walls of their laboratories and design bureaus, are arising as a serious obstacle in the way of the innovator. It is permissible to ask, who gave them the right to the truth in the last instance? In essence, to usurp power over the advancement of the proposals of innovators. Is this not soil for the appearance of fictitious joint authors from among managers?

It is quite obvious that the need has arisen for the development of an effective public system of the influencing of the acceleration of scientific and technical progress, for the radical restructuring of all the work on invention and efficiency promotion and on its changeover to the path of intensive development, and for the decisive overcoming of the mechanism of deceleration.

However, one must not count on it that the new methods of management in themselves will lead to radical changes in the practice of invention and efficiency promotion. Such a point of view is thoroughly mistaken. The processes, which are occurring in the management of the economy, are merely facilitating our restructuring and are creating a base for the radical improvement of all the work with inventors and efficiency experts. The success of restructuring depends on the willingness and ability of

the councils of the All-Union Society of Inventors and Efficiency Experts to carry out their activity under the new conditions and on the persistence and pugnacity of each organization of the society. On the other hand, their active vigorous stand in many respects will promote the quickest formation of a new economic mechanism in the sphere of science and technology.

In fulfilling the decisions of the congress, the organizations of the All-Union Society of Inventors and Efficiency Experts increased their influence on the introduction of valuable developments of innovators, on their selection and inclusion in the plans of the development of science and technology, and on the taking of an inventory of inventions which have not been introduced for a long time.

Annually thousands of inventions and efficiency proposals are introduced locally with the assistance of the councils of the All-Union Society of Inventors and Efficiency Experts.

In the last 4 years on the suggestion of the Central Council 112 models of new equipment, in which 637 inventions, which were developed by inventors, scientists, and production workers, were incorporated, were included in the State Plan of USSR Economic and Social Development and the plans of ministries and departments.

At the same time we clearly understand that all the work of the councils of the All-Union Society of Inventors and Efficiency Experts on the public monitoring of the use of inventions and efficiency proposals requires further substantial improvement.

Further the speaker noted that during the period under review more concrete assistance began to be given to individual authors. Unfortunately, we were not always able to help them, but in a number of cases we succeeded in achieving positive results. We succeeded in preventing, for example, the elimination of the creative laboratory at the Makhachkala Separator Plant, which Honored Efficiency Expert of the RSFSR Viktor Alekseyevich Starokozhev heads. Today favorable conditions have been created for this innovator for the development of new highly efficiency separators of his design.

As a result of the appeal of the Central Council and the State Committee for Inventions and Discoveries to the State Committee for Science and Technology with regard to the introduction of the effective developments of Professor M.D. Barskiy, an inventor of the Ural Polytechnical Institute, as of January of this year the Republic Center of Dry Fractionation Methods was established under the Ural Department of the Academy of Sciences.

In recent times, Ye.I. Tyurin said, the councils of the All-Union Society of Inventors and Efficiency Experts have begun to devote significantly more attention to the monitoring of the observance of legislation on invention and efficiency promotion. During the checks many disturbing facts were revealed. Last year alone more than 2,000 cases of gross violations of prevailing legislation were identified. As a rule, this is the violation of the deadline of the examination and the procedure of the qualification of proposals, the calculation of the economic impact, and the payment of the author's reward.

Thus, the Murmansk Council of the All-Union Society of Inventors and Efficiency Experts of the Fish Industry revealed cases of the direct violation of the procedure of paying the reward with respect to more than 120 used proposals. They became the subject of discussion of the trade union committee of the Sevrybkhodflot Administration, which obliged the administration to correct the situation and to take steps against the guilty parties. In accordance with the representation of the organizations of the All-Union Society of Inventors and Efficiency Experts the chief engineer of the garage of the Kaliningradrybprom Association was punished for systematic red tape with the examination and use of the proposals of innovators.

The work of a number of ministries (the Ministry of Machine Building for Animal Husbandry and Fodder Production, the Ministry of the Shipbuilding Industry, the Ministry of Instrument Making, Automation Equipment, and Control Systems) was seriously criticized on the part of the Central Council of the All-Union Society of Inventors and Efficiency Experts for violations of the procedure of paying the author's reward. During the checks it was revealed, for example, that in the Ministry of Chemical and Petroleum Machine Building the rewards to authors were paid with respect to only one-third of the inventions. There were cases, when inventors did not receive the reward for 7-9 years.

As a result of our intervention in the Ministry of the Shipbuilding Industry and the Ministry of Nonferrous Metallurgy the additional requirements on the submitting for approval of documents for the payment of the author's reward, which lead to lengthy official procrastination, were abolished. Now the state of affairs with payment in these ministries has improved substantially.

The participation of representatives of the All-Union Society of Inventors and Efficiency Experts in the legal defense of the rights of inventors and efficiency experts has become a new important direction of our activity. The 3d Plenum of the USSR Supreme Court at the request of the society specified the powers of representatives of the All-Union Society of Inventors and Efficiency Experts in the people's courts. This, first of all, is due to the fact that the personnel of law enforcement organs are very bad at finding their bearings in the legislation on invention. At times this leads to serious

violations of socialist legality. Last year after the intervention of the Central Council of the All-Union Society of Inventors and Efficiency Experts the verdicts of the courts with respect to a number of unjustly convicted inventors in Moscow, Leningrad, Magadan, and Kiev were reversed for lack of corpus delicti.

In the last 3 years alone the Central Council with the assistance of the aktiv has defended in the courts the interests of 150 inventors. This is an extremely important and necessary matter. The honor and dignity of inventors and efficiency experts often depend on its skillful organization. Henceforth we will also actively defend the interests of innovators and will regard this as our, it can be said, sacred duty.

At the same time we should clearly realize that under the conditions of the intensification of democratization, first of all, a strong mechanism of public influence on the development of invention and on the increase of the role and authority of the creator of technical ideas and solutions, which creates a reliable barrier against any encroachments upon the legal rights of the innovator, is necessary.

The successful provision of reliable guarantees of the rights of inventors and efficiency experts is impossible without the substantial increase of the general educational and cultural level of the working people and the increase of their legal, scientific, and technical knowledge. We believe that the instruction of the working people in the principles of inventing, efficiency, patent, and license work should become a part of the system of education.

In the national economy one specialist in three, who is engaged in patent work, received training at public institutes of the All-Union Society of Inventors and Efficiency Experts. The Central Council reorganized the public institutes of patent studies into institutes of creative technical work and patent studies and reinforced them with personnel.

Today primary organizations of the All-Union Society of Inventors and Efficiency Experts, the number of which already exceeds 118,000, have been set up at enterprises and organizations of all sectors of the national economy, at many academic institutions, higher educational institutions, and vocational and technical and other educational institutions of the country. Thus, our society has great opportunities to actively influence the state of inventing and efficiency work in labor collectives.

Under the conditions of cost accounting and self-financing the councils of the All-Union Society of Inventors and Efficiency Experts jointly with economic managers and trade union organs have to think in earnest about how to increase the contribution of inventors and efficiency experts to the real revenues of the enterprise.

Under the new conditions it is becoming specially important to know what share of the profit is formed directly from the activity of innovators.

As is known, today the role of the collective contract in the development of production and the solution of social problems is increasing substantially. In this connection the responsibility of the primary organization of the All-Union Society of Inventors and Efficiency Experts for the drafting and inclusion in the collective contract of specific proposals, which provide guarantees of the rights and privileges of innovators, especially the payment to them of the reward from the funds of the enterprise, is increasing significantly.

The moral and material stimuli of the development of innovation in the labor collective in many respects will depend on how sound and fundamental the stand of the council of the All-Union Society of Inventors and Efficiency Experts is when including the necessary demands in the collective contract.

The development of democracy and self-management, naturally, entails the broadening of the group of questions which are being worked on by the councils of the All-Union Society of Inventors and Efficiency Experts. The use of economic stimulation funds, the spending of assets on work with innovators, and the recommendation of inventors and efficiency experts for state awards and honorary titles should, in our opinion, be carried out with their mandatory participation.

Under the new conditions of management the councils of the primary organizations of the All-Union Society of Inventors and Efficiency Experts should become equal representatives of labor collectives in the settlement of all questions of invention and efficiency promotion. Therefore, it seems, it would be correct to reflect the corresponding status of the organizations of the All-Union Society of Inventors and Efficiency Experts in the future Law on Trade Unions.

Trade union committees in many cases hold a controlling position with respect to the councils of the All-Union Society of Inventors and Efficiency Experts and unnecessarily watch over them. In the majority of cases the oblast councils of trade unions and the committees of the trade unions of enterprises are not giving the councils of the All-Union Society of Inventors and Efficiency Experts the necessary assistance. There are also such instances, when the councils and committees of trade unions when selecting management personnel for the staffs of the councils of the All-Union Society of Inventors and Efficiency Experts proceed not from the business qualities of the recommended people, but from the necessity of providing them with a job.

Work with young people, the goal of which is to increase the interest of the young generation in invention and efficiency promotion, Ye.I. Tyurin continued, is an important field of our activity.

About 5 million boys and girls are taking part in various forms of the work of the All-Union Society of Inventors and Efficiency Experts. However, as before, a large gap exists between the creative potential of young people and its actual use. Is it really possible to regard as normal the state of affairs in many republics of Central Asia and Transcaucasia, where less than 1 percent of the total number of young workers and specialists are taking part in inventing and efficiency work?

One should not forget that precisely young people, who are testing themselves in invention, especially need diverse practical help, including in the drawing up of applications and the making of a patent search. The Central Council of the All-Union Society of Inventors and Efficiency Experts and the All-Union Komsomol Central Committee should take with regard to this matter specific steps which change the state of affairs for the better.

We must think about more effective interaction with our closest partner—the Union of Scientific and Engineering Societies.

I would like to mention that the interaction of the All-Union Society of Inventors and Efficiency Experts with scientific and technical societies has a history of more than 30 years. In our opinion, subsequent joint work should be organized with allowance made for the fact that specific social strata and groups with their specific peculiarities and interests are behind each of our organizations. For the All-Union Society of Inventors and Efficiency Experts these are inventors and efficiency experts—the main body of the organization of the society—and worker-innovators, whose interests it is first of all obliged to represent and defend and for whom it is obliged to create the most favorable conditions for creativity.

The introduction of elements of cost accounting, which should become an important unit of the social mechanism of the rapid introduction of inventions and efficiency proposals and help involve innovators themselves in this process, the speaker said further, is becoming one of the fundamentally new directions.

At present the necessary legal, organizational, and financial conditions exist for the development of cost accounting principles. A decree, which permits the establishment under organizations of the All-Union Society of Inventors and Efficiency Experts of temporary creative collectives, has been adopted. The Central Council has drafted and sent to local organizations detailed recommendations on the application of this decree.

In spite of the short time since the appearance of these documents, more than 130 temporary creative collectives have already been organized and have begun activity in various cities of the country, including Volgograd, Moscow, Kemerovo, Surgut, Donetsk, and a large number of others.

We are convinced that the establishment and active work of an extensive network of introducing organizations attached to the councils of the All-Union Society of Inventors and Efficiency Experts will have a substantial influence on the speeding up of the introduction in production of valuable developments of inventors and efficiency experts. It is necessary merely that our councils would display more initiative and persistence and would not be afraid to undertake the settlement of new questions.

At present with the support of party, soviet, and trade union organs another form of the cost accounting introducing activity of the All-Union Society of Inventors and Efficiency Experts—engineering and technical cooperatives, of whose work our councils act as the guarantors—is also becoming widespread.

A new direction of our work—the development of the amateur creative technical work of the working people—requires the closest attention. At present more than 460 clubs and 62 base clubs attached to regional councils of the All-Union Society of Inventors and Efficiency Experts have begun work in the country. The Ukrainian, Kazakh, Bashkir, Stavropol, Volgograd, Kalinin, Penza, Yaroslavl, Ulyanovsk, Crimean, and Nikolayev councils of the All-Union Society of Inventors and Efficiency Experts are working actively in this direction.

At the same time, in carrying out the monitoring of the creation and support of the conditions for the efficient work of the clubs, we are faced with the inaction and inertia of a number of industrial ministries. The majority of sectorial orders on the establishment of clubs of amateur creative technical work are of a formal declarative nature. Only 8 of the 15 head ministries have specified the list of tasks for their accomplishment by independent authors. The head institutes and design bureaus, which are responsible for the designing of independent equipment, thus far have not been approved by several ministries, as a result of which the large creative potential of independent authors has thus far not been put to use.

Further the speaker dwelt on the draft of the USSR Law on Inventions, the need for which had already been spoke about at the last congress of the All-Union Society of Inventors and Efficiency Experts.

The Central Council, taking into account the interests of the inventing community at large, is taking a most active part in its drafting. The majority of our suggestions have been included in the draft of this document.

What is the position of our society on the Law? We believe that the Law should ensure the socioeconomic interest of both enterprises and inventors in the introduction of technical innovations, the significant increase of the prestige of the inventor, and the creation of

especially favorable conditions for his creative activity. The primary thing here is that the Law should secure the exclusive right of the inventor to his invention.

It would also be important to reflect in the Law the powers of the All-Union Society of Inventors and Efficiency Experts as a public organization which represents the interests of inventors.

We support the numerous positions of innovators on the necessity of publishing the draft of the Law in the open press for its extensive discussion.

From this lofty rostrum it is necessary to stress the enormous interest of our society in the quickest completion of the work on the Law. The participants of many conferences and congresses of the organizations of our society, which were held to hear reports and elect officials, justly spoke about this.

Unfortunately, today it has to be stated that the organizations, which are responsible for preparing this most important document (the State Committee for Science and Technology, the Academy of Sciences, the State Committee for Inventions and Discoveries, the Ministry of Justice, and others), obviously dragged out the drawing up of the draft of the Law.

The protection of the rights of efficiency experts remains a no less urgent problem. At present the State Committee for Inventions and Discoveries has prepared a draft of the new Statute on Efficiency Promotion, with which for the present we cannot agree, since the principle of the centralization of the management of efficiency activity was made the basis for it.

In our opinion, it is necessary to give the enterprise more independence in the settlement of these questions. Under the conditions of cost accounting and self-financing the economic or social utility of an efficiency proposal, regardless of what it is by its nature—a technical or organizational proposal—should become the basis of its classification.

Here I would like particularly to stress that it is necessary to link all legal norms more closely with the new economic mechanism. It bothers us greatly that today in standard documents only the material incentive fund is named as the basic source of the payment of the author's reward. In this connection there is no firm guarantee that due to the lack of the necessary assets innovators will receive the reward due to them. In no case must one allow this.

We are convinced that the economic mechanism of stimulating the authors of inventions and efficiency proposals should ensure the unconditional payment of author's rewards for the use of technical innovations.

In conclusion the speaker dwelt on the new version of the Charter of the All-Union Society of Inventors and Efficiency Experts. The necessity of drafting a new version of the Charter stems, first of all, from the profound changes, which are occurring in the economy and social life of the country, as well as from the most important tasks, which were posed by the 27th CPSU Congress, the subsequent CPSU Central Committee plenums, and the 18th Congress of USSR Trade Unions.

The changes in the content and forms of the activity of the society, which follow from the USSR Law on the State Enterprise, the decree of the CPSU Central Committee, the USSR Council of Ministers, the All-Union Central Council of Trade Unions, and the Komsomol Central Committee on steps on the further development of amateur creative technical work, and the Charter of USSR Trade Unions, as well as numerous remarks and suggestions of inventors, efficiency experts, and members of the All-Union Society of Inventors and Efficiency Experts found reflection in the draft of the Charter.

The rights and duties of the primary organizations of the All-Union Society of Inventors and Efficiency Experts, their independence, and the financial possibilities for the organization of creative work with inventors and efficiency experts were increased significantly.

On behalf of the congress delegates the speaker assured the CPSU Central Committee that the members of the All-Union Society of Inventors and Efficiency Experts

would apply all their powers, knowledge, and experience for the implementation of the decisions of the 27th party congress and the subsequent CPSU Central Committee plenums and would make a worthy contribution to the acceleration of scientific and technical progress!

[Box, pp 6-7]

**Statistics of the Congress (According to the Data of the Credentials Commission):**

In all 1,400 delegates, who represent 14.6 million members of the society, were elected for the congress, of them 1,098 delegates were elected for the first time; the largest delegation is from the RSFSR—817 delegates, with 285 from the Ukraine, 61 from Kazakhstan, 52 from Belorussia, 37 from Uzbekistan, 21 from Azerbaijan, 17 from Latvia, 15 from Estonia, 14 from Lithuania, 14 from Moldavia, 14 from Armenia, 10 from Kirghizia, 10 from Tajikistan, and 6 from Turkmenia; 43 nationalities of the USSR were represented at the congress; 1,150 delegates are inventors and efficiency experts; 279 have the titles of honored inventor or efficiency expert of a republic; 4 honored inventors of the USSR were at the congress; among the delegates there are more than 700 workers and 425 engineering and technical personnel; academic and sectorial science sent 130 delegates to the congress; among the delegates there are 47 Heroes of the Soviet Union and Socialist Labor and 50 winners of the Lenin and USSR State Prizes.

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**Gosplan Official on MNTK Funding**

*18140026a Moscow NTR: PROBLEMY I RESHENIYA*  
in Russian No 15, 2-15 Aug 88 pp 2, 3

[Interview with Anatoliy Antonovich Reut, first deputy chairman of USSR Gosplan, by V. Baronin: "From Analysis to Action/Operation"]

[Text][Question] Anatoliy Antonovich, in the middle of May a meeting took place with MNTK representatives in Gosplan's consolidated department on problems of foreign-economic activity and fulfillment of the Soviet-West German treaty on scientific and technical cooperation and on the state order for the coming year. Are you not too overconcerned about the MNTK? Are you not taking the place of the USSR State Committee for Science and Technology?

[Answer] I would not say that. The 23 presently operative MNTK's created for the main directions of scientific and technical progress are oriented to carrying out the entire cycle of work from idea to organization of production of equipment and new generations of technologies as well as the newest materials. These are scientific-research institutes, design bureaus, enterprises and institutions of 30 ministries and departments. In addition to them, tens of institutes, plants and factories take part in the work of MNTK's. And it should be said that this tremendous force does not always operate smoothly, qualitatively and effectively. Consequently, we have distributed all the MNTK's according to departments of Gosplan for the purpose of regulating the course of events literally on the go. There are no problems, let us say, with Svyatoslav Nikolayevich Fedorov (the Mikrokhirurgiya Glaza [Eye Microsurgery] MNTK) and he is not within the confines of Gosplan, but should something start slipping—we would together look for a solution. We work on problems together with ministries, departments and individual enterprises.

As for replacing the USSR State Committee for Science and Technology, it for all practically purposes is not involved. It is engaged in its own problems: it determines technical policy and directions of scientific search. We are engaged in questions of planning, investment and improvement of the MNTK's organizational structure and we help in establishing their cooperation with these or those parts of the national-economic complex as a whole. This actually is work on determining where we are proceeding correctly and where correction is required. The main thing is not to carry out this correction in words but in deed.

[Question] Anatoliy Antonovich, the actual idea of your work is comprehensible, but our readers would be very much interested in learning what specific questions have to be solved and why?

[Answer] There are more than enough such questions. Let us start with the fact that the MNTK were created during the period of transition from administrative-command to economic methods of management. Today the socioeconomic and political situation in the country is radically changing. It is necessary to keep up with these changes. Thus there are quite enough institutes within the framework of the MNTK, but their scientific and experimental base is weak. Therefore they are unable to work productively in all directions whether we want it or not. The other side of the medal is independence of enterprises and regions. Is this really good? Of course. And here is a concrete example: in speaking at the 19th All-Union Party Conference, Chazov, the USSR minister of health, pointed out that we purchase abroad a large amount of drugs, but we should be producing them ourselves. And actually these drugs cost us millions of nonconvertible rubles [invalyutnyye rubli (?)]. We can't produce them ourselves? Nothing of the sort, we can. The Biogen MNTK has developed an entire range of medicinal preparations. But these preparations must be carefully verified and only then turned over for production. For this, the Riga affiliate of Biogen with the biotest center needs to be expanded. Incidentally, the Latvian Ministry of Construction did not want in any way to accept the order for such work. We resolved this question at the level of the chairman of the republic's Council of Ministers, and then again an obstacle: of the plan's 470,000 rubles only 53,000 rubles' work was completed in the first half of the year. The construction people say that they are building kindergartens. Kindergartens are necessary, but no one else will solve for us the other problems.

Another question. It is possible to carry out work from an idea to a testing model or an industrial series only where you have an experimental-production base. But in many cases, it is insufficiently developed, and the MNTK went around like poor relatives, supplicants looking for manufacturers. This is a completely intolerable situation. For this reason we are doing everything possible to develop a testing and experimental base for the complexes. This year 215 million rubles have been allocated and in the future we shall very likely increase allotments 1.5-fold. In brief, we shall invest into the development of testing and experimental bases for MNTK as much as the builders in the region can assimilate.

Finally, we have the following problem. MNTK heads are raising the question of increasing centralized capital investment, especially in hard currency. This is partially understandable. But such an approach frequently leads to unpayable debts. This means that it is necessary to switch to currency self-support—it is necessary to learn how to earn money. We recommend that you obtain credit and undertake any work. We are ready to go before Vneshtorgbank [Foreign Trade Bank] as guarantors for the return of these funds. Of course, not on the basis of altruism but on the basis of a clear-cut and

unequivocal analysis of the possibilities of MNTK and a careful weighing of their scientific and technical stockpiles.

There only remains to be added to this the fact that sometimes in solving one or another problem, heads of MNTK run into the traditional running around in circles. As the result of exchange of opinions, we reached an agreement at our conference that if such a situation develops, it will be necessary to get out of the circle and to turn to us. We will find with joint efforts a rational solution.

[Question] Tell me, how the new economic practice affects interrelationships of the MNTK with their partners? After all, according to the law, they are completely independent and can, as they say, establish "rules of the game" on equal terms.

[Answer] It is too early to say that all questions have been ironed out here. Friction occurs, and excesses occur. Speaking at the conference, Fedorov said that they decided in his firm to create a flying operative unit from a reequipped IL-86. With its availability, it would be possible by flying, let us say, to Sverdlovsk to teach the new methods of treatment to all the specialists of the affiliate in 2-3 weeks. In the course of interruptions between such work, one could fly abroad and earn up to 300,000 dollars in operations. A sensible idea? Of course, it is sensible. But then Svyatoslav Nikolayevich, achieving every possible kind of solution in this regard, turns to the Ministry of Aviation Industry. He is told: an aircraft with alterations would cost twice as much as a series-produced one—such appetites have not been dreamed of by any entrepreneur. Or another example. The Mekhanobr MNTK agreed with a client on a price of 320,000 rubles for a mill and according to the existing work rules offered proposals for inclusion into the state order of the Ministry of Heavy, Power and Transport Machine Building. Uralshmash, the manufacturer, upped the price to 850,000 rubles, which was quite unacceptable to the customer. The state order remained suspended. But it seems to me that these difficulties are a temporary phenomenon, a kind of intoxication with independence. A certain amount of time will pass and the MNTK will be provided with a testing-experimental and production base and will be surrounded by a system of engineering centers and cooperatives, and their prestige will grow as creators of new-generations of equipment. In this way, the monopoly of certain enterprises and institutes will be undermined. The other ways of solving the problem are ineffective.

Moreover, for the purpose of improving their viability, the USSR State Committee for Science and Technology, Gosplan and the USSR Academy of Sciences together with the country's Gosnab and the Ministry of Finance have prepared the draft of a decree of the USSR Council of Ministers "On Measures for Boosting the Work Effectiveness of Intersectoral Scientific and Technical Complexes Under the New Conditions of Management."

This document makes more precise the status of the MNTK as organizational forms uniting the efforts and coordinating the activity of the organizations comprising the complex.

The principal element of the proposed mechanism of MNTK operation is the transition to designated financing of targets through funds formed for disposition by the complex, including awarding of bonuses and currency. Economic benefits would be established for payments into the budget for the production of new products corresponding to the world standard. The draft also includes proposals for improving material and technical supply and improving foreign economic activity.

[Question] Anatoliy Antonovich, I understand perfectly that major work with complexes of the USSR State Committee for Science and Technology and Gosplan is being conducted—hundreds of millions of rubles of capital investment for the development of a testing and experimental base and working up of proposals whose realization would permit the solution of the problem of basic research, it is not possible to enumerate everything. But are we getting from them, I would like to ask, more problems or results?

[Answer] Judge for yourself. Analysis of the work of the MNTK shows that they ensure stable growth of the most important developments at the national-economic level being introduced into series production: from 16 in 1986 to 43 in 1987 and up to 78 in 1988. According to data of the USSR State Committee for Science and Technology, the share of developments exceeding the world standard or without world analogues amounts to 22 percent today.

In the first half of this year, the fuel and power complex produced 2.6 million tons of petroleum versus 2.3 million tons under the plan due to developments of the Nefteotdacha [Petroleum Production] MNTK with employment of the latest methods of exploiting oil beds under difficult geological conditions.

In the machine-building complex, on the basis of developments of the Mekhanobr MNTK, six KID-600 crushers were series produced as opposed to two under plan. Due to developments of the Svetovod MNTK, 1,379 kilometers of optic cable for city, area and main-line communication lines were produced. This significantly exceeds the plan's target.

The Nauchnyye Pribory [Scientific Instruments] MNTK fully fulfilled the state order for 1988 in the production of 20 KhZh-1309 liquid chromatographs. The USSR Ministry of Instrument Making, Automation Equipment and Control Systems on the basis of developments of the same MNTK fabricated Millikhrom-2 chromatographs, ensuring full fulfillment of the state order for this entry.

The Mikrokhirurgiya Glaza MNTK performed 60,900 operations instead of the 50,100 according to the state order. Four of its affiliates went into operation in Leningrad, Cheboksary, Krasnodar and Moscow, each with a capability of performing 12,000-15,000 operations a year.

But these are only general data. Let us turn to particulars. Let us take, for example, the Nauchnye Pribory MNTK. A joint enterprise with partners from the Federal Republic of Germany was created within the framework of this complex for the production of modern computers. It is already expected that this year several thousand computers will be produced, mainly for scientific work. The development and production of instruments based on developments of the MNTK increased considerably in 1988.

Things are going quite well at the Mekhanobr MNTK. Here talks are going on on the creation of joint enterprises in Bulgaria, France, the United States and Finland, which would make it possible in the future to sell in all the countries of the world not only mills for processing minerals but entire complexes of equipment for ore-concentration production operations. The effectiveness of capital investment in the complex amounts today to 6 rubles per ruble of expenditures.

As regards the principal subject of discussion at our conference, the state order in the coming year, without going into details, I shall only say that instead of the 78 entries of the order, it on the proposal of the MNTK will grow to more than 100 entries. And for most of them, the end result of work will be either a model of new equipment or a series delivery of a new product as a rule on the level of world achievements or without parallel in world practice. Mikrokhirurgiya Glaza will perform 170,000 operations instead of 110,000 operations this year.

[Question] Anatoliy Antonovich, at a recent meeting at the Academy of the National Economy attached to the USSR Council of Ministers, it was said specifically that a part of the MNTK are working poorly. It seems to me that this is most unprofitable for the state budget. How long will you tolerate such a situation?

[Answer] The creation of essentially new models of science-intensive products and the development of their series and mass production is an extremely complex matter and, unfortunately, not a fast one. I agree that the state of affairs at the MNTK largely depends on the tactics and strategies of work organization of their leaders. But, on the other hand, we must give them the opportunity to prove themselves and to remove all hindrances out of their way. Only in that case will it be clear what one's personal value is and what was impossible to do even if one is as wise as Solomon. It seems to me that cavalry attacks are out of place in this matter. It is necessary in each case to look attentively where we are going in the necessary direction and to correct deviations there where circumstances require it. I believe that a guarantee of success lies in such an approach.

#### Disbursement of Centralized Funds for S&T Research

18140036a Moscow NTR: PROBLEMY I RESHENIYA  
in Russian No 16, 16 Aug-5 Sep 88 p 4

[Article by N. Berzon, candidate of economic sciences, docent of Moscow Higher Party School, and A. Palamar-chuk, doctor of economic sciences, professor of the Department of Economics and Organization of Industrial Production at the Moscow Institute of National Economy imeni G.V. Plekhanov: "Cost Accounting and Finances of Science"; first two paragraphs are source introduction]

[Text] The question of the size of centralized funds for performance of scientific-research and experimental-design work provoked a sharp dispute among specialists. As B.L. Tolstykh, the deputy chairman of the USSR Council of Ministers and chairman of the USSR State Committee for Science and Technology, admitted: "Economic science so far has not provided us with model guidelines to be used as a basis for determining the optimal proportions and sizes of financial resources released to ministries' centralized funds." (See NTR, No 13, 1988.)

An article continuing the discussion on the work of science under the new conditions deals with this and other problems of financing scientific-research and experimental-design work. (See NTR, Nos 5 & 7, 1988.)

In the past 15 years, a rather stable tendency emerged for reducing the return of research and development on new equipment. Thus, in 1986 economic effectiveness per ruble of expenditures for the introduction of new equipment in industry amounted to 46 kopecks. Let us remember that in the 9th Five-Year Plan it was equal to 54 kopecks. Let us note that significant monetary resources are being allocated for the development of science and technology. For example, in 1987 more than 30 billion rubles were allotted for these purposes. This amounts to 5 percent of the country's national income.

Why is it that financial levers for acceleration of scientific and technical progress do not work sufficiently actively? It is possible to indicate two principal reasons: financing separated from the end results of the scientific-production activity of scientific-research institutes and design bureaus and credit extension insufficiently intensively used in science. The transfer of organizations to cost accounting raised a problem—who should pay for developments (the enterprise which accepts them and earns the money or the ministry responsible for the implementation of a unified scientific and technical policy) and how much?

The system of financing scientific-research and experimental-design work in use at the present time does not provide a full answer to these questions. Shall we first try to determine who pays today?

For a long time, the system of financing developed along the path of centralization of funds at the sectoral level. Subsequently they were distributed between enterprises and organizations according to the directions of development of science and technology. Scientific-research institutes and design bureaus performed work on the basis of work orders of the ministry, which paid for the research.

On completion, developments were turned over gratis to enterprises, which, however, frequently declined the "gifts of science," citing the fact that they were not ready for the introduction of production capacity or lacked the necessary materials and components, free space and so forth.

Cost accounting presupposes the emergence of economic interest in producers for innovations. But for this, enterprises must have at their disposal their own funds for financing scientific and technical measures and concluding contracts with scientific-research institutes and design bureaus. However, hardly any plant will risk financing new-development research that would provide real fruit only in the future. In order not to lose perspective at the sectoral level, a centralized fund is created for the development of production, science and technology. It is here that the problem arises of determining optimal relations between the size of funds existing at the disposal of enterprises and centralized funds at the sectoral level. Thus, for example, an increase in the size of a centralized fund expands a sector's possibilities for determining future research and development but reduces the size of the money left at the disposal of enterprises and weakens the cost accounting ties of science with production.

For 1988, for sectors whose scientific organizations changed over to the new conditions of management, the centralized fund amounts on the average to about 40 percent of the total size of funds for scientific-research and experimental-design work. In our opinion, this figure is unjustifiably oversized. Often work that is of no state or sectoral value is financed from this fund. Sometimes ministries rescue institutes with whom producers refused to conclude contracts because of low quality of developments through the means of centralized funds. For example, as in the case of the Central Scientific-Research and Planning-Design Institute of Mechanization and Power Engineering of the timber industry. Its Ministry of Timber, Pulp and Paper and Wood Processing Industry came to the aid of the failing institute and provided it with a 70-percent state order. (See NTR, No 3, 1988.)

We assume that the size of a centralized fund should amount to 20-25 percent of the total amount of money used for the development of science and production. Where did this figure come from? From the analysis we conducted on the volume and structure of the works of thematic plans for more than 170 scientific organizations of the machine-building complex. The analysis showed that the share of promising work in sectors of industry should amount to 10-15 percent of the total volume of scientific-research and experimental-design work and to another 10-15 percent of developments of general sectoral value. Further growth of the centralized fund will inevitably lead to the development of administrative methods of management. It is worth noting that today perestroika proceeds less painfully for those scientific-research institutes and design bureaus which prior to the transition to full cost accounting and self-financing developed contractual relationships with industry and earned their own financial resources as, for example, the scientific organizations of the USSR Ministry of Electrical Equipment Industry. On the threshold of their transition to the new work conditions, the ministry in 1987 put at the disposal of enterprises 50 percent of the financial resources used for the development of science and technology (instead of the 25 percent set aside earlier). Such a maneuver helped production people to become accustomed to independence and scientific organizations to study market conditions and work directly for the satisfaction of the sector's needs.

But with the transition of science to cost accounting, a problem arose as to who would pay institutes for development work started earlier on the basis of work orders from ministries. It is recommended to carry out a detailed inventory of completed scientific-research and experimental-design work and to determine what scientific-research and experimental-design work will go into state or sectoral orders and for which ones economic agreements should be drawn up with industry. The result may be that for some developments no specific ordering enterprise will be found. What does one do in such cases? We believe that they should be terminated and paid for by the ministry for the actual expenses incurred.

No less difficult and important is the question of what the payment procedure should be. In financing scientific and technical work, the client pays for the cost of individual stages. Such a system of settlements prompts the performer to complete a larger number of stages and to boost their cost, which results in higher prices and longer development time (one of the causes of obsolescence). As the result of payment by stages at scientific organizations, the volume of uncompleted scientific-research and experimental-design work is growing at a fast rate, that is, financial resources taken out of circulation become frozen.

Without a doubt, payment is more progressive when a scientific organization obtains money in full for completed work. But a problem immediately arises: on what will the institute exist prior to the completion of a

development? According to today's data, its average duration is approximately 3 years. In the course of this time, it is necessary to pay salaries to staff workers and to pay bills for raw and other materials, fuel, power and so on.

In the course of practice, scientific organizations have worked out several variants for the solution of this problem. For example, advances by a client for the costs of a performer in the process of conducting scientific-research and experimental-design work. Such a system akin to payment by stages does not interest the performer in the quickest possible completion of a development.

In beginning of the 1980's, an attempt was made for banks to extend credit for expenditures. Clients' funds were the resource support of credit released in connection with the abolition of intermediate payments and transferred to a bank. This system did not take root in sectors of industry as it is very cumbersome, increases paperwork and, the main thing, does not solve the problems of creating a financial mechanism interesting scientific organizations in accelerating carrying out of scientific-research and experimental-design work. Actually, the old procedure was retained, with the sole difference that financing of expenditures is done not by the client but by the bank.

In our view, the financing of expenditures in the performance process of scientific and technical developments through the means of scientific-research institutes' and design bureaus' own working capital corresponds to the principles of full cost accounting. Such experience has already been acquired in sectors. The first scientific organizations were provided with their own working capital as far back as 1978. At the present time, scientific-research institutes and design bureaus of the electrical equipment industry and a number of others have working capital in amounts adequate for normal scientific and technical work and the sale of products on the basis of contractual prices.

Norm setting of working capital makes it possible to accurately classify it by makeup and sources of financing. Analysis shows that more than 50 percent of the working capital of scientific-research institutes and design bureaus is amenable to norm setting. For the most part, it is commodity stocks in reserves and uncompleted production. The norm setting of working capital makes it possible to determine its optimal size. Let us remember that today the relative share of norm-set working capital at industrial enterprises exceeds 83 percent.

The proposed system of financing, of course, must be supplemented by bank credits for covering additional expenditures arising in connection with early delivery of raw materials and equipment by enterprises, performance of any unique one-time developments and late payment by clients for scientific and technical products.

### Price Formation for 'S&T Products' Debated

#### Strict Pricing Norms Needed

18140024 Moscow EKONOMICHESKAYA GAZETA  
in Russian No 33, Aug 88 p 14

[Article by Candidate of Economic Sciences M. Podnos, head of a laboratory of the VNIItstroydormash Scientific Production Association, under the rubric "Scientific and Technical Progress: Economics and Management" (Moscow); "A Beacon or a Cliff?" first three paragraphs are introduction of the Division of Economics of Scientific and Technical Progress and the Modernization of the National Economy of EKONOMICHESKAYA GAZETA]

[Text] The prices for scientific products now, given the mass changeover of scientific research institutes, design bureaus, and planning institutes to full cost accounting, have become a central problem of the economic mechanism in science. And this is also understandable. For as soon as it was specified that the result of scientific research and experimental design work is a commodity, the question of how to evaluate it and what to take as the starting point when determining the price immediately arose. And here two approaches, two different views on the solution of this problem clashed. The advocates of the first propose "not to invent the bicycle," but to take the path beaten by industry, that is, to direct attention to strictly controlled expenditures. To counterbalance this it is demonstrated that a specific result, impact, and benefit, which the introduction of a scientific and technical innovation gives the client, should be the basis for the price.

And the debate thus far is not over. At times diametrically opposed views and opinions are expressed. In particular, the publications in EKONOMICHESKAYA GAZETA (Nos 6, 15, 19, and 20, 1988) also speak about this.

Suggestions to establish a common standard procedure of determining contract prices on a unified methodological basis, which takes into account either the expenditures or the consumer impact, or both, continue to arrive at the editorial board and central economic departments. In short, it is necessary to examine carefully the questions of the pricing of the scientific product, to weigh carefully all the arguments "for" and "against," and to find the most efficient solution, which ensures the continuous improvement of production and the maintenance of product quality at the present world level. We hope that our readers will voice their opinion on this question, which is vitally important for the development of science.

Sectorial science has begun to live according to the laws of cost accounting. Just recently this seemed unrealistic and unrealizable. But already today the customary categories for the physical sphere—the commodity, the price, the profit, standards—are firmly becoming a part of the daily life of scientific organizations.

However, it is hardly worth counting on success, if scientific research institutes are left without standard procedural support of their cost accounting activity. Meanwhile thus far scientific personnel have not been provided with the rules of the new economic order. Much is not clear both with the state order on science and with intra-institute cost accounting, and especially with the contract prices for the scientific product.

At times one has occasion to hear that instructions and model statutes are of no use, it is not necessary to "spoon feed" paragraphs of a decree to institutes and to bind their hands. But, after all, it is a matter of new and fundamentally important questions of by no means "local" significance. And not every institute, as it will take it into its head, but the state organs, which are responsible for the management of science, should settle them.

Let us turn to practice. Take if only contract prices for the scientific product. For the present there are no recommendations on their determination. Methods of calculating the expenditures have not been developed, standards of overhead expenses and norms of planned accumulations are lacking. That is why one also need not be surprised that development is increasing in cost before one's eyes. Moreover, all the components of the price are making their "contribution" here.

The overhead expenses, for example, when each scientific research institute establishes them independently, often exceed by two- to threefold the wage fund of scientific personnel, thereby reflecting the imperfection of the structure of management of the institute—overstaffing and numerous management divisions and services.

Thus a conflict appears between the interests of the administration and scientific personnel. The attempt to resolve it within the organization often only gives rise to conflicts and the heating of passions and is detrimental to the basic work. The intersectorial and intrasectorial differentiation of the overhead expenses of institutes, in my opinion, will help to settle the question. The establishment of the maximum norms of spending for these purposes would hinder the perennial inclination of the administration to surround itself with services.

Another component of the prize is amortization deductions. This important and constantly increasing item of expenses previously was not taken into account at all when calculating the expenditures. Today it is not longer possible to do without it. Many institutes and laboratories have been provided with expensive instruments, computer hardware, and other equipment. But along

with them such ones, in which a fountain pen and paper are the basic means of production, also exist. Here, of course, their conditions for pricing are different. And common norms of amortization, which are not differentiated by different fields of scientific research, are hardly appropriate here. The USSR State Committee for Science and Technology, in our opinion, is also obliged to clarify this matter.

Now let us turn to planned accumulations. Today there are no limitations for them! It would seem to be progressive. But what happens in life? The profit norms in the price of such a commodity as methods, all-union state standards, and reports often significantly exceed the profit norms in the prices for prototypes. It also happens that the profit from individual developments on the improvement of already operating production "looks down" on its namesake in the state order. Although it is clear that the latter is issued for the performance of the most important, priority scientific jobs which are significant for the national economy. The immediate gain drives the future into the corner.

I believe that many experienced workers will support me: approved norms of planned accumulations are needed. And not so much as a limiter of the amount of the profit, but rather as a regulator of priorities. For example, the differentiation of the norms of planned accumulations subject to the type of scientific product is being practiced at the Kvant Scientific Production Association. The report on the conducting of scientific research and experimental design work yields a profit in a amount of 15-20 percent of the direct expenditures, drawings—20-25 percent, and a prototype—35-40 percent.

What are the advantages of such a solution? In my opinion, the scientist will be protected against the unrestrained aspiration of the administration to incorporate in prices as high a level of planned accumulations as possible. If a development promises a large impact and has been included in a state order, let the client himself establish the level of planned accumulations on the basis of the anticipated profit. It is then that this will also be a real contract price.

In making such suggestions, I do not want at all to have the reputation of being a reactionary, who is calling down on the heads of the poor directors of scientific research institutes and design bureaus another instruction. It is a question of economic standards, which should serve as a beacon, and not a cliff in the stormy sea of the new economic mechanism. It should not be thought that the effect of economic standards is confined to the sphere of the distribution of the profit and deductions for stimulation funds. Standards should encompass to no less a degree the area of the formation of prices and especially such an important component of them as the share of the profit, which is included in the price.

The problem of calculating the profit from the sale of the scientific product is directly associated with pricing. It is necessary to abandon the very conditional estimation of the efficiency of scientific developments according to what are called "adjusted expenditures" and to change over to direct estimates in accordance with the actual profit from the introduction of scientific developments.

This assumption is not an innovation. Many scientific collectives and scientists are advocating it. The problem is merely to measure the profit from the development of new equipment and technology. And here economic science is eternally indebted to equipment and technology. It is not keeping pace with the requirements of the quickly changing economic mechanism.

We have just recognized the scientific product as a commodity. Now it is necessary to go farther. To adapt accounting to the evaluation of the results of its use in the economy.

Today we take into account the expenditures by items and the results from economic activity as a whole. But we need to know the financial result from the use of each new technology and each new type of equipment. If we learn to do this, we will get a more precise and objective idea of the efficiency of the activity of scientific collectives. This will also advance us in the formation of a flexible mechanism of the pricing of the scientific product, which meets present requirements.

#### Independent Pricing Defended

18140024 Moscow EKONOMICHESKAYA GAZETA  
in Russian No 33, Aug 88 p 13

[Article by Candidate of Economic Sciences A. Kazakov, deputy chief of the Division of the Improvement of the Economic Mechanism of the USSR State Committee for Science and Technology, under the rubric "At the Intersection of Opinions": "The Fear of Independence"]

[Text] Why under the new conditions is it impossible to link pricing just with the expenditures on the production of the scientific product?

First of all the expenditure system of pricing in science signifies a return to the old, to events of 20 years' standing, when the estimated cost of scientific research and experimental design work was determined subject to the actual individual expenditures which the institute bears. This would signify the loss of the already attained positions. The point is that even given the system of economic relations, which had been in effect since 1979 in sectorial science, the dividends of an institute depended little on its expenditures on development. Work worth hundreds of thousands of rubles might not have given a scientific organization a kopeck of accumulations. And, on the contrary, technical solutions, which required substantially fewer allocations, were capable of contributing significant monetary receipts to the economic stimulation funds of the institute. For example,

85 percent of the material incentive funds of scientific organizations of the USSR Ministry of Chemical and Petroleum Machine Building, which prior to the changeover to full cost accounting and self-financing came to tens of millions of rubles, were formed subject to the efficiency of scientific research and experimental design work. So is it worth turning back? Is it not better to think about how to use creatively the already gained experience?

It is also impossible not to take into account a second circumstance. It is necessary to know how to calculate expenditures. If we face the truth, we do not know how to calculate expenditures and especially to substantiate them. They are suggesting that we make them the starting point of prices, but this is a very unstable basis. And here parallels with industry are hardly appropriate. Inasmuch as there the expenditures are planned on the basis of the time allowances for the performance of operations and the norms of the consumption and use of equipment, tools, and accessories. It is another matter in science. Here it is impossible to standardize scientific research and experimental design work on the development of new equipment on the basis of the data on past expenditures. For they reflect yesterday's level of development of science and technology. Labor expenditures also hardly lend themselves to standardization. The specific nature of scientific labor introduces practically insurmountable difficulties in the determination of economically sound expenditures. And what in general is the role of expenditures in the evaluation of intellectual labor?

I believe that one should also consider that the expenditure approach equalizes the brilliant and the dull and reduces to a single denominator a development, which is capable of yielding a significant impact, and a very mediocre report. Is it reasonable to determine the value of creative labor and what scientific activity is, by relying on the anticipated expenditures? Apparently, it hardly is, inasmuch as such an approach would obviously orient the activity of science toward colorless developments and would introduce in advance glaring unfairness in the evaluation of the scientific contribution.

The introduction of the standard of profitability, in my opinion, torpedoes the entire new economic order. How? If we agree with the supporters of the expenditure approach and determine the price of a contract by starting just from the expenditures, a question arises: But with respect to what expenditures should we establish the standard of profitability? And it is here that the leapfrog of opinions begins. The advocates of the expenditure approach have literally drowned in endless debates in this regard. But no matter how you turn: to establish the standard of profitability with respect to all the expenditures or with respect to the amount of work, which is performed on one's own, is the same result—in both cases the developers are interested in the overstatement of the estimate. Therefore, fearing (and not without grounds) the uncontrollable increase of expenditures,

they suggest as the base the planned wage fund. There is no need to prove that such a solution paralyzes the stimulating role of the new economic mechanism and, if we speak more precisely, reduces it in practice to naught, inasmuch as under the new conditions of management there can be everything, but there cannot be a planned wage fund. Therefore, the standard of profitability is not a harmless step and not some little element there, which regulates pricing. Far from it. It has a radical effect on the entire economic system of the functioning of science.

The next argument, which is advanced by the advocates of regulated prices, is that free contract prices will introduce anarchy and spontaneity and will undermine the economic might of the country. Therefore, they say, a standard of profitability, which protects the state against ruin, strikes the hands of self-seekers and scroungers, and in general saves state assets, is needed. In spite of the extraordinary popularity of these arguments among the advocates of the expenditure approach, I will undertake to assert that the standard of profitability is a poor watchman, a poor guardian of state assets. Here is confirmation of that. The method of the pricing of prototypes and individual orders was in effect since 1971. The standard of profitability—20 percent—was stable over the last 15 years. But what is the cost of prototypes? It soared by 2.5- to 3-fold. Of course, here the rise of expenditures also played its role, but the share of their "spiral" for the purposes of deriving more profit is also significant.

Moreover, apparently, one should specify of what scale of "chaos" it is a question today. The total production volume in the country is approaching 800 billion rubles. While for 37 ministries, which have been changed over to the new system of management, the amount of scientific research and experimental design work being performed comes to 5.4 billion rubles.

The "value of science," as we see, is barely more than 0.5 percent. So what are we particularly jeopardizing?

If we read carefully the decree on full cost accounting in science, the broadening of independence, initiative, and everything, without which normal scientific research and creative work are impossible, is the key direction. The recognition of independence for scientific collectives in the matter of determining contract prices along with the change of the system of the planning, financing, and stimulation of science is one of the key features. And if we actually begin to encroach on the right of scientific organizations in the area of pricing, hardly anything will remain of their independence. And here we are approaching the central issue. So what is interfering with the practice of establishing contract prices? What is actually in its way?

Unfortunately, the main restraint is fear, the lack of confidence in one's own powers. Since we have taken the path of full cost accounting, it makes it incumbent to speak the truth. But the truth is such that not all the

personnel of science had faith in cost accounting and, therefore, are demanding guarantees. Hence their aspiration to obtain a "legitimate" method, which, although useless, reliably shields against any surprises.

Today, as never before, very much depends on the stand of scientific collectives themselves.

Conferences, at which the first results of the work of scientific research institutes and design bureaus under cost accounting are being summarized, are being held in many sectors. Moreover, the questions of the standard support of the pricing of the scientific product are being discussed at them. Such a conference was held, for example, in the USSR Ministry of Agricultural and Tractor Machine Building. Its participants unanimously spoke out against any sublegal enforceable enactments whatsoever, which regulate the interrelations of clients and developers when determining the contract prices for the scientific and technical product. In their opinion, any procedural elaborations on the activity of scientific organizations under the new conditions of full cost accounting can be of only a informative, recommendatory nature. Let us heed the opinion of scientific collectives, for in the end they are to work under the new conditions of management.

#### Pricing Competition Urged *18140024 Moscow EKONOMICHESKAYA GAZETA in Russian No 33, Aug 88 pp 14-15*

[Article by N. Artemov, general director of the Parma Scientific Production Association (Perm): "Toward What Is the Price Gravitating?"]

[Text] The prices for the scientific and technical product are the key question of cost accounting in science. Thus far the debates on it are not subsiding. Furthermore, they often depend on the quality and efficiency of developments and on all kinds of attendant conditions, such as the monopoly position of the developer, the financial status of the consumer, the timeliness of the performer, and others.

Therefore, it is not by chance that many people are tormented by the question: How is one to bring contract prices in line with the real use value of the scientific commodity? What is my stand? First of all I resolutely object to any attempts at administration by mere decree with determining contract prices. Otherwise their entire economic essence is emasculated. To say, for example, that the contract price is set too high, is nonsense.

This concerns not only the prices for the scientific and technical product, but also the prices for products for production engineering purposes. Therefore, the procedure of establishing contract prices for products for production engineering purposes, which was specified by the decree of the USSR State Committee for Prices of 29 December 1987, causes, to put it mildly, bewilderment. In conformity with it contract wholesale prices are

determined on the basis of the economically sound expenditures on the production and sale of products and the profitability with respect to the production cost in an amount that is not more than its planned level during the current year for the enterprise as a whole. Everything, it would seem, is fine, but it is incomprehensible why such prices are called contract prices.

All of us will probably agree that, perhaps, the competitiveness or competition of developments can become the only most correct and reliable means of increasing the objectivity of contract prices. The consumer, of course, should have the right of choice. "Monopoly dictation" under the conditions of contract prices is intolerable. It will inevitably lead to the unrestrained and unsound increase of prices with the simultaneous decrease of product quality.

I appeal to direct the gaze of the scientific community at precisely the questions of the development of competitiveness in science. Enough arguing about the fact that contract prices might be set too high. It is necessary to study and create the economic organizational conditions, under which they realize their advantages.

But for the present I will share the good advice of a well-known economist: "Look at your product with the eyes of the consumer and establish the price at such a low level that of all the alternatives accessible to him he would rest his choice precisely on it."

#### Declining Funds for Long-Term Development Projects

18140334 BAKINSKIY RABOCHIY in Russian  
14 Jul 88 p 4

[Article by Yu. Manzon, deputy director of VNIIPTneftmash, honored economist of the AzSSR: "Science in Cost-Accounting"]

[Text] From the pages of the newspaper, I would like to share some thoughts on the effectiveness of the work of scientific research institutions. The more so, since a sharp and principle-minded discussion on this was held at the 19th All-Union Party Conference.

Here is something, for example, which is disturbing. Over the last 2-3 years, the interest of ministries and departments in long-term development projects has dropped sharply. One of these projects concerns the problem of allocating production forces and developing sectors and rayons. Today, almost no work is being done in this area. A specific example: the comprehensive program for scientific and technical progress in machine building and metal processing in the period from 1991-2010 was being developed in the republic. However, right now its development has been stopped. The reason is lack of financing.

Having dealt for many years with the problems of predicting scientific and technical progress, I can cite examples of the financial collapse of large companies with billion-dollar turnovers, which occurred as a result of underestimating promising research. We must not permit information hunger, which hinders the development of scientific and technical progress.

It is incomprehensible why this subject does not interest Gosplan, the republic Academy of Sciences or even the USSR Ministry of Chemical and Petroleum Machine Building, to which the VNIIPTneftmash institute leadership has repeatedly turned with appeals and requests to solve the problem of financing long-term research projects. Meanwhile, however, tangible shifts in this problem have not been achieved. By this time, specialists in long-term forecasting are changing profession or being dismissed, and it will not be easy to gather them and join them together again later.

The indicators for development of scientific and technical progress in machine building for the 13th 5-year period should already be being refined today. However, there is no one to refine them. The project has remained unfinanced. The reason for the existing situation, in my opinion, lies in the fact that the reorganization process in connection with converting to cost-accounting, not only in institutes and scientific-production associations, but also in ministries and departments, has been too prolonged. Methodologies and resolutions on rights and responsibilities have still not been prepared and many problems of the legal and financial interrelations between them have not been solved. In my opinion, there is a solution to this situation. Long-term development projects must be mandatorily included in the state order for scientific production associations and institutes. Then, the process of coordinating nominative and methodological documents will not be such an obstacle in the path of developing the forecasting of scientific and technical progress.

Meanwhile, effective mechanisms for including the interests of labor collectives in the work of developing scientific and technical progress have still not been found. In my opinion, excessive regulation of the levels of raises paid to scientific workers hinders the creation of such a reliable mechanism. I do not know why the final level of for a pay increase was set at 50 percent of the official salary. I think that these notorious "50 percents" are the unique contribution of the equalization system of wages for scientific workers. Essentially, it is a factor which obstructs the development of creative activity.

When our institute studied documents and resolutions published on cost-accounting in scientific institutions, we observed that they are trying to unify the planning of science within these institutions with the planning of industry. Many of my colleagues, and I absolutely agree with them, believe that monthly planning is far from the best variant, even in industry. Yet this is generally impermissible in science. Yet another problem ensues

from the above-noted tendency. How would things be with the uniform planning of the implementation of production in a scientific production association, in which industrial commodity production and scientific production were expressed as a single sum? This situation creates many questions, answers to which have not yet been found.

Finally, we must solve the problem of assigning scientific workers to perform the tasks of departments and organizations which do not have financial possibilities at their disposal (people's control, party and soviet organizations). These assignments contradict cost-accounting. Beyond a doubt, the need for assignments will not vanish in the future either. However, in this case, the labor of scientific workers should be paid for from a special fund. In my opinion, the special-purpose deductions of scientific organizations and scientific production associations could be a source for forming this fund. Our institute's collective, in particular, is ready to begin this.

These are only a few of the problems which I would like to raise here. They all require timely solutions. The mechanism for accelerating scientific and technical progress ought to operate effectively and meet the needs of radical economic reform.

**Role of Bank Credit in Promoting S&T Progress**  
*18140020 Moscow EKONOMICHESKAYA GAZETA*  
*in Russian No 29, Jul 88 p 6*

[Article by M. Zotov, chairman of the Board of the USSR Promstroybank, under the rubric "The Decisions of the 19th All-Union Party Conference Into Life": "The Ruble Works for the Future"]

[Text] At the 19th All-Union Party Conference, it was emphasized that the acceleration of scientific and technical progress is the basis of the economic and social strategy of the party. Unfortunately, we are still lagging behind the leading countries in the output of modern products and machines. And this is given the fact that our country has the largest scientific and technical potential in the world and provides nearly a third of the world scientific output and a fifth of the technical solutions that are registered annually in the world.

However, statistics attest: the enormous potential, to which scientific thought has given rise, is being used extremely inefficiently.

According to the data of the USSR State Committee for Statistics, in 1986 only a fourth of the inventions, which are protected by inventor's certificates, were implemented in production. Due to this new ideas did not have an appreciable effect on the results of the work of industry. A gap has formed between science and practice. Extraordinary steps are necessary so that it would disappear and our economy by 2000 would hold leading positions in the world.

What can and should the USSR Promstroybank do for the quickest introduction in the national economy of advanced scientific and technical developments?

**Where Is One to Get Money?**

Billions of rubles of assets have been channeled in recent years into the construction materials industry. However, the technical level of the majority of its enterprises, as before, is extremely low. Now in 1987 about 1 billion rubles were spent on construction and installation work alone in the sector, but they did not obtain the anticipated return from them. The technical lag is so serious that the thorough modernization of the sector even in case of the present, quite high level of the allocation of state assets will drag on for tens of years. Unfortunately, not just the construction materials industry is in such a situation. What is the solution?

It seems that it would be wise to use for the retooling of the technical base of sectors, which have lagged behind, the credits of foreign banks, for which it is possible to acquire advanced technologies and equipment.

It is well known to the readers of EKONOMICHESKAYA GAZETA that joint ventures are now being established with both socialist and capitalist countries. For the present there are few of them. But this is one of the means of increasing the technical level of domestic industry, and the number of joint ventures, undoubtedly, should be increased.

At present 119 plans of the establishment of such enterprises, half of which are oriented toward the output of machines, equipment, and components, more than 20 percent—toward the organization of the production of various materials and chemical products, and 14 percent—toward the output of consumer items, are being analyzed.

The analysis of the indicators, which were incorporated in the technical and economic substantiations of 10 joint ventures, which have opened by this time current accounts at the USSR Promstroybank, shows: the total expenditures on their establishment come to 210 million rubles, while the annual output of products comes to 330 million rubles. Given an accounting profit of 40 million rubles the Soviet founders and the state budget will receive 30 million rubles, 10 million rubles of them in foreign currency. The profitability of several types of production is being planned at the level of 70 percent.

The settlements for the modernization of domestic enterprises will be made not with raw materials, but with finished products. Their sale on the world market will ensure the repayment of the made outlays in a short time. All this will provide the necessary financial and material resources, which it will be possible to channel into the rapid development of science-intensive sectors.

### Credit for Scientific and Technical Progress

The task of banks is to stop the spending of state assets on the measures, in which the country is not interested. Here they should become equal economic partners of industry. The basis for such cooperation is credit.

Present credit differs radically from the credit which was granted enterprises up until recently. Loans for fixed and working capital for the output of a new product, for the assimilation of new technological processes, for the development of new types of machines and equipment, for the introduction of new methods of the organization of production, and for work, which is aimed at the increase of the quality and reliability of items, are being developed.

This year the USSR Ministry of the Machine Tool and Tool Building Industry received credit for 3.5 years for the acquisition of scientific and technical products in the amount of 30 million rubles. The credit will be repaid by means of the centralized fund of the development of production, science, and technology of the ministry. In particular, the sector has to carry out the modernization of approximately 1,300 types of equipment that is being produced so that by the end of the five-year plan the share of the production of its most important types, which correspond to the world technical level, would come to not less than 86 percent in the total output.

Nevertheless the share of advanced credits in the total amount of credit investments for the present is still small. Here especially intense work of the bank is required, it is necessary to cultivate in enterprises a taste for these credits.

Now it has been deemed expedient to concentrate the credit resources of banks first of all on the development of science-intensive sectors and economic complexes, on the replacement of production capital, and on the implementation of important national economic programs.

On the one hand, by relying on recognized scientific developments, the enterprises, when obtaining a loan, will feel more confident. On the other, the bank will also more willingly invest money in measures with an obviously high return. It has been granted the right to issue along with credits for individual measures of scientific and technical progress long-term credit for the organization of the full cycle of the output of a new product—from scientific research development and the making of prototypes to its series production. These loans will be repaid by means of the fund of the development of production, science, and technology.

When extending credit priority will be given to the development and introduction of fundamentally new types of equipment and products, which correspond to or exceed the world level. The plans of enterprises on the updating of production and contracts and orders for the development of a scientific and technical product serve

as the basis for such loans. The term of the extension of credit is established by the bank with allowance made for the sectorial standards of the updating of products and the recovery of expenditures. However, it cannot exceed 3 years. Thus, the economic effectiveness of the measure, for which credit is extended, will be taken into account.

A precise estimate of the economic effectiveness of the objects being developed is necessary for the obtaining of credit. When issuing credit for the development of new equipment, the bank should know how good the product, which is produced by means of it, will be: for equipment is developed not for the sake of equipment (for example, if we issue a loan for a new line for the production of shoes, we should be confident of the quality of the shoes).

The equal partnership of the bank and enterprises means that the bank is obliged not simply to respond to the requests of enterprises, but also to recommend for precisely which operations it is worth getting credit. Advice of this sort requires very high skill of the workers of banks.

### Young People Are a Reliable Partner

Today a large number of developments are being devised by way of initiative, by individual enthusiasts, and by creative collectives, which have been organized on a voluntary basis. If such works are promising, the bank supports them and extends credit for them in the same way as it does for the works of scientific research institutes and enterprises.

A typical example. One of the enterprises spent more than 1 million rubles on the development of a new generation of a domestic display. Finally they assembled the display. But, alas, it turned out to be similar to the quite obsolete American analog. Moreover, a large quantity of imported components was required for its series production. Against one's will one had to think: Is it worth starting its production? Is it not wiser to immediately develop another model?

In August 1986 at the same enterprise, they established a temporary youth scientific and technical collective. By the fall of 1987, the 20 people had already completely designed, produced, adjusted, and turned over to all commissions prototypes of the new display. Its development cost one-tenth as much as the previous one. The labor intensiveness of production proved to be one-half as great. But the new terminal has a fivefold greater speed of information processing than the American analog. While the primary thing is that the instrument was produced entirely on a domestic element base. The display has been put into mass production, while the youth collective is already prepared to substantially improve this model as well. Incidentally, we are willingly supporting youth collectives. As a rule, the search for nontraditional solutions distinguishes them. Now in the

country there are about 100 scientific and technical centers of young people. Preferential credit at a lower interest can be granted to them.

#### A Bank for Inventors

The agreement between the Ministry of Construction, Road, and Municipal Machine Building and the USSR Promstroybank on the development in the shortest possible time at the Rzhev Machine Building Plant of capacities for the production of tower cranes of a new modular type was the first step toward the search for new forms of the interrelations of the bank with enterprises on the basis of the credit mechanism. In addition to production facilities, here they are building apartment houses and children's institutions. The bank assumed approximately half of the expenditures on the modernization of the enterprise. In conformity with the contract the profit of the enterprise will be distributed between the plant and the bank. The parties bear mutual responsibility for successful placement into operation and the results of the financial and economic activity of the enterprise. In case of the upsetting of the construction deadlines the guilty parties, including the bank, will be fined. The agreement was concluded exactly a year ago, while the first and second sections of the facilities under construction have already been put into operation in a record short time.

At present the question of organizing joint stock banks in Leningrad on the basis of the oblast administration of the Promstroybank and the Energomash and Tekhnokhim state interbranch associations is being considered. Similar banks will be established at the Volga Motor Vehicle Works and several other enterprises.

And there is another new type of bank—the innovation bank. Assets for scientific development will be concentrated at such banks. Both entire collectives and individual citizens will be able to become their clients. Here, for example, inventors and efficiency experts will find financial support. Such a bank is being established in Leningrad, while subsequently innovation banks will also appear in other large industrial centers.

Other forms of the financial support of scientific and technical progress are also being considered. One thing is unquestionable: every ruble, which has been issued by the USSR Promstroybank, should work for the encouragement of creative research, for the introduction of new effective methods in the practice of management, and the rapid development of the country.

#### Newspapers Overwhelmed by Questions on S&T Self-Financing

18140036b Moscow EKONOMICHESKAYA GAZETA  
in Russian No 38, Sep 88 p 6

[Article by M. Andreyeva: "All Roads Lead... to the Center"]

[Text] Life, as we know, does not tolerate a void or uncertainty. The answer to a troubling question must be found without fail. And the decision on transferring

applied science to full cost accounting has given rise to a whole avalanche of questions. Where does one find the necessary information? Some scientific workers have rushed to the library and others to management, all in vain. Theory has not kept up with practice, and one must look on one's own for answers. A wave of seminars, conferences, discussions, meetings and "round tables" has engulfed Moscow.

I well remember the animated debates at the section meeting of the scientific-practical conference on problems of management of science. In the assembly hall of the Institute of Economics of the USSR Academy of Sciences strong feelings were amuck. The hall hungrily listened to each speech as though a sieve separated the standing from the "barren" kind. In the case of some speakers, a telephone number was relentlessly demanded, they were questioned in detail in efforts to get the gist of things; others were showered with applause, not allowing them to spell out details. In all probability we shall long remember the siege of assembled Yu. Brodskiy, deputy director for economics of the LenNIIkhimmash Scientific Production Association, V. Kharin, department chief of the USSR State Committee for Labor and Social Problems and A. Kazakov, deputy department chief of the USSR State Committee for Science and Technology.

That conference graphically showed how necessary today the unique science information desk was, a central point to which one could turn to for the most diverse questions.

This is evidenced by the editorial mail. Each day, it brings tens of letters for the column "100 Questions on Cost Accounting in Science." Readers write that they have perhaps not a hundred but a million questions. It is no accident that they were interested in the report in EG, No 34, to the effect that a consultation center has begun to function in Moscow, specializing in questions relating to transfer of science to full cost accounting and self-financing.

What is this? In my searches for an answer, I went to I Kibalchich Street where one such center was located in the building of the financial institute, established jointly by the Kvant Scientific-Production Institute and the Moscow Financial Institute.

On the 10th floor, people have gathered who obviously are not of student age. The setting is consultation day. Many are looking through lists of their questions so as not to forget anything.

I make the acquaintance of one of the visitors. Oleg Aleksandrovich Yefimov, chief accountant of the experimental-design bureau of the cable industry. We go together to Professor Boris Ilich Maydanchik, the center's deputy chairman.

"What are you interested in?"

"Everything. We have moved on to the first model of cost accounting. A great deal is unclear concerning wages and finances. But first tell us how your center can help us."

Boris Ilich describes in detail the different forms of consulting. The most popular is holding thematic seminars. They are conducted for the most part by specialists from central economic departments. They have already completed studies on the principal problems of transfer of scientific organizations to full cost accounting and self-financing, wages, price formation for scientific products, internal cost accounting of scientific-research institutes, methods of evaluating the effectiveness of scientific products and legal aspects of transfer to the new conditions of work. The autumn seminars will deal with problems of planning and analysis of the work of scientific organizations.

Individual consulting is performed at the center (twice a month). In addition, one can obtain here official materials and written explanations.

"How much does this cost?"

"A full subscription costs 400 rubles a year. But if one wishes, one can pay either for participating in seminars or for individual consultation. This will cost half as much."

I go together with Oleg Aleksandrovich to arrange for a subscription. It turns out that all it involves is to make a payment at the savings bank. After my companion completed all his business, he wanted to know:

"Why does the experimental-design bureau resort to such an unusual form of collaboration at this time? Would it not be possible to find out everything at one's ministry?"

"It is possible in principle. You see, they have besides us hundreds of organizations and cannot give much time to each one. The new official documents reach us after a delay. In addition, everyone interprets them differently. Under the conditions of cost accounting, it is necessary to have accurate and quick information. Here, at the center, we hope they will deal with us at length, not on the run. Thus we think that costs are reimbursed."

I made the acquaintance of two visitors to the center and was interested in learning where they came from. It turned out that they were representatives of the Moscow Textile Institute and were interested in the principles of transferring VUZ science to cost accounting.

"Does this mean that the center serves principally the capital and its environs?" I ask the question of Ye. Osadchey, the academic secretary of the center's council.

"Oh, no! A comrade recently came from Vladivostok. We have had visitors from Riga, Minsk, Voronezh, Magnitogorsk, Leningrad, Vladimir, Dnepropetrovsk,

Alma-Ata and Yaroslavl. From the most diverse organizations—state universities and VUZ's, small design bureaus and large scientific-research institutes, academic institutes and industrial giants. Our partners include the Institute of Electric Welding imeni Ye.O. Paton, the Acoustical Institute and the Leningrad Institute of Social-Economic Problems of the USSR Academy of Sciences. We have subscriptions from Kriogenmash, Plastik and Temp scientific-production associations."

"What are the principal questions they ask?—I indicated my interest to consultant V. Dvoretskiy."

"It all depends on the degree of mastery of cost accounting. Those who now have been working for six months are deeply interested primarily in problems of internal cost accounting. Those who have only begun to enter into the course of the work ask about the most general things. We request visitors not to be bashful, otherwise we won't succeed in liquidating economic illiteracy."

"Are there many such illiterates?"

"There are enough of them. Even capable economists come. These go for explanations—for the confirmation or refutation of their point of view, their position. But so far there have been few of them."

Consultants working at the center get to see a great deal. In dealing with hundreds of people, they have the possibility of analyzing the process of transfer of science to cost accounting and self-financing. That same Dvoretskiy observed that most of the visitors are concerned with how an institute would earn enough to survive. Few are interested in boosting the efficiency of their work. What does this show? That they have assimilated so far only the fringes of cost accounting, but the "roots" are hidden as before for the scientists. They have not dug deep enough to reach them.

Boris Ilich Maydanchik sees the contradictoriness of issued documents as such an obstacle.

"I have the impression," he says, "that cost accounting in science lacks a chief designer. Here I am picking up all these new documents. I have in my briefcase 22 basic plus 50 special ones. I added them to the file and believed that they would somehow end. But now there is an avalanche of explanations and instructions. They have started to promulgate decrees on changing a paragraph of one and a subparagraph of another. How do the specialists orient themselves in such a deluge? Do we really need a flood of documents? In my view, only two are needed—the actual decree on the transfer and a model contract on making (turning over) scientific and technical products."

"What new forms of work does your consultation center propose to introduce?"

"We shall employ 'round tables' and are developing business games. For example, how to conduct a contract campaign, how to organize a temporary creative collective and how to carry out in a short space of time retraining of personnel. There should be about 15 such games. They should also be more widely used for learning about the resources of computer technology."

I believe that readers have already become convinced that consultation centers are a necessary and useful endeavor. The very fact that more than a thousand persons have visited the Moscow center in eight months is persuasive evidence of that.

"The need for consulting is tremendous," I was told by A. Kazakov, deputy chief of the Department for Improvement of the Economic Mechanism of the USSR State Committee for Science and Technology. "I can tell on the basis of my own experience—it is as if they would literally tear me into pieces. I was on a field trip for half a month speaking at instruction conferences."

"Where else are there centers comparable to the one in Moscow?"

"More accurately, to those in Moscow: there is one, for example attached to the Plekhanov institute and to VNIIERPANT [expansion not available]. Comparable centers are beginning to operate in Leningrad, Kiev, Odessa and Alma-Ata."

"I shall plainly state that geographically it is quite poor. The Urals, Siberia and the Far East are without such services. That is why they travel to the Moscow Financial Institute from Vladivostok. Why should Leningraders be drawn to the capital's financial institute when their consultation center is close by?"

"Probably because of the quality of consultations," A. Kazakov proposed. "There is an acute shortage of qualified personnel."

But why had they not provided for this in preparing for the transfer of science to full cost accounting? Was it that difficult to foresee that a radical fracturing of the system of management of scientific organizations would give rise to a mass of questions? A lot of precious time was lost in wandering around in the dark, in "inventing the bicycle" because of shortage of information. Is it not because of such oversights that the economic reform in science, as pointed out at the 19th All-Union Party Conference has not so far radically changed the situation?

What then is the USSR State Committee for Science and Technology doing today to eliminate the lag as admitted by its personnel in such an important undertaking? It is planned to create a network of consultation centers in

various parts of the country. It is still only being planned. The committee's personnel are slowly getting underway, although it is their direct duty to do everything necessary for the successful transition of science to full cost accounting and sharp increase of its payback. And to have consulting set up to deal with the basic questions of transfer of science to full cost accounting and with problems of intra-institute cost accounting lies within the capabilities of sectoral institutes for upgrading of qualifications and councils of cooperation which were created attached to many party obkoms. In a word, many could have applied themselves to eliminating the informational scarcity, but they have not done so. What does not exist cannot be provided.

When then will science's "information desk" fully satisfy the requirements of those in need?

#### Ovchienikov Accused of Engrossing Funds for Favorite Projects

18140026b Moscow NTR: PROBLEMY I RESHENIYA in Russian No 15, 2-15 Aug 88 p 7

[Article by Professor A. Klesov, doctor of chemical sciences, USSR State Prize winner: "Monopolism in Science"]

[Text] Of the many woes of our science, journalists as a rule skirt one of the chief ones—monopolism.

Monopolism in science in my opinion is a phenomenon in the presence of which the normal development of research in a specific field is distorted because of forceful methods [silovyye priyemy]. Here I especially underscore the role of "forceful methods" whose external manifestation naturally can be different in each concrete case.

But regardless of how different "forceful framing" of monopolism might be, its basis is found in the absence of healthy scientific competition, inadequate openness in adoption of decisions and ignoring of democracy in the actual organizational sphere of science.

True, I would like at the outset to make several clarifying comments. First of all, there can be competition, sometimes even tough competition, even under the conditions of scientific monopolism. But all this struggle takes place within a single scientific "eparchy." It is a struggle between "one's own people" to which corrections are introduced by a scientific leader. And the tougher he is as an individual, the greater the differences in public assessments of his colleagues (today—a favorite, but tomorrow the chief refuses to see you).

Further. A monopolist in science cannot operate successfully without relying on the bureaucratic apparatus. Thus he must be not only a scientist but also a commander. The "ideal" variant is the combination in one person of a scientific leader and a highly placed individual possessing the real power of a director. But as a rule, such a monopolist does not limit himself to a single "executive"

position. He tries to take control of the entire scientific administrative ladder. And when this problem of consolidating the monopolist's power is solved so to say vertically, growth of the monopoly then occurs horizontally. Utilizing scientific organizational levers, the leader appoints "his own people" to numerous scientific and expert councils, commissions and organizational committees and makes them chief editors of the most important journals and directors of research institutes. Eventually, a system is created which makes it possible for a single person, namely the leader, to regulate in a most effective manner the development of a single and sometimes many fields of modern science.

I shall now risk comparing our science with the armed forces. Imagine that the commander of an army occupies at the same time the position of a commander of a division, regiment, battalion, company and platoon. There can hardly be any doubt that in such a case his platoon will be the "most invincible in the world." But there likewise can be no doubt that the enemy, even a symbolical enemy will easily break through the defense in any place where the "platoon of the army's commander" is not located. Of course, my conjecture is far-fetched since there is no army in the world where such an absurd situation could be found. The commander must be like "their own father" to those under him. By acting otherwise, he would simply deprive his army of its fighting efficiency.

But that which is impossible, absurd, in an army from the point of view of common sense is actually "programmed" into the present structure of our science.

In the field of science in which I am engaged—biochemistry—Academician Yu.A. Ovchinnikov, the deceased vice president of the USSR Academy of Sciences, was a most remarkable monopolist. A person of extraordinary abilities, he occupied at least 12 key posts—from chairman of the Section of Chemico-Technological and Biological Sciences to director of the Institute of Bioorganic Chemistry and chief of the laboratory at that same institute (remember the "invincible platoon of the army commander"). Among biochemists working at the academy, one question used to come up quite legitimately in friendly relations with other researchers: "Whose man is he—Ovchinnikov's?"

What did this monopolism result in? First of all in a fantastic concentration of power, in extremely uneven financing of both individual institutes and whole research directions, in unfair strong-willed decisions both in regard to his subordinates and in regard to staff members of other institutes. Recently, Academician A. Bayev told at a meeting how the institutes of our department are financed. Thus, in three of the 12 scientific-research institutes there is allotted ten- to twelve-fold as much money per staff member as in the others. And who headed the richest institutes? Of course, the vice president of the USSR Academy of Sciences Yu.A. Ovchinnikov.

I could cite still more examples, but I think that it would be quite wrong to direct the readers' attention solely to the figure of Yu. Ovchinnikov. It is sufficient to say that the vice president of the USSR Academy of Sciences Ye. Velikhov occupies at the present time at least 16 key posts, Vice President A. Yanshin—14 and Academician V. Sokolov—11.

Probably in the analysis of such a public phenomenon as monopolism in science, we should turn our attention not only and not so much to the personality of the leader (although, it goes without saying, we cannot manage without that) but to the special features and the system of organization of our science, which developed over the course of several decades.

We cannot help but see that in the last year the academy's new leadership has done a great deal to change this system. There is no longer the concentration of power in the heads of domestic chemistry and biology, a decision was adopted on an age qualification for occupying scientific administrative posts, elections are conducted for directors of academic scientific-research institutes, the heads of many scientific journals and chairmen of scientific councils have been replaced, and work conducted at academic institutes will be financed differently.

But is all this enough for us to be able to say that today optimal decisions are being made in the academy? I believe that it is as yet too early to speak of this.

Would it be possible to avoid old mistakes? Of course, yes! We already know well the ways in which optimal decisions are developed. This is maximal glasnost, democracy of scientific organizational procedures and healthy competition of scientific talents.

**New Election, Appointment Rules Create Confusion**

*18140033b Moscow SOTSIALISTICHESKAYA INDUSTRYIA in Russian 6 Sep 88 p 2*

[Article by SOTSIALISTICHESKAYA INDUSTRYIA special correspondent A. Valentinov: "An Irregular Situation"; first seven paragraphs are SOTSIALISTICHESKAYA INDUSTRYIA introduction]

[Text] They discussed the problem thoughtfully and on the verge of a scandal.

"You illegally hold the position of director, the collective did not elect you," V. Simonov, acting head of a laboratory, advanced his main thesis.

"No, it is you who are sitting not at your place: a new manager has been elected to the laboratory," A. Chistyakov, director of the institute, countered.

"Nothing of the sort. I was elected manager. And unlike you, I was elected legally."

"And you were the first to extend a hand to me."

"Yes, I did. Yet not for election, but for appointment. Now I see that I made a mistake."

"I also made a mistake: I ought to have fired you immediately."

It is approximately on such a level that the two serious managers debated. And at time it became awkward for those present at this dispute. And also for the very "opponents." But they were never able to turn onto the practical track.

"An irregular situation"—that is how A. Smirnov, chief of the Soyuzlegkonstruktsiya Association, described the protracted conflict.

Perhaps, it is possible to agree with Aleksandr Nikolayevich with just one reservation: an irregular situation only in that the disputing parties decided to defend their interests from positions, in which for the present they still feel extremely uncertain. But in the rest the situation is typical. It arises nearly always, when a new director comes to an institute.

In common parlance this is called "a new broom." While in bureaucratic language it is the necessity of personnel and structural changes in connection with the new tasks that have been set for the collective. In this case the tasks were set for the TsNIIiprojektlegkonstruktsiya, which from a planning institute had also become a scientific research institute. While in November of last year Doctor of Technical Sciences Professor A. Chistyakov was entrusted to bring the collective to the next height.

They did make an assignment, but how is this to be officially registered? Of course, a meeting of the collective, at which Chistyakov would have presented his program, if such exists, should have been held. But, first, it is still unknown in what direction the voting would turn, inasmuch as no one knew Chistyakov—he is from another institute. But they do not like "Varangians" very much in scientific surroundings. Second, the departments of the TsNIIiprojektlegkonstruktsiya are scattered from the western to the eastern borders of the country. To gather all the associates in the capital will cost a pretty penny given full cost accounting. Therefore, the management of the association jointly with the council of the labor collective decided to economize: they voted in the council of the labor collective for the appointment of the director, while a little latter at a conference of the labor collective they approved the minutes, having inserted in it as if unintentionally the word "elected." Together with the other members of the council of the labor collective both times V. Smirnov also raised his hand "for." And somehow he did not think that he was participating in the violation of democracy. He guessed this later.

Not once has it been proven: a new broom should be soft, tactful. So that those, whom it sweeps out, would perceive this painful process correctly. They sensed, so to speak, involvement in the changes and boldly moved in the indicated direction. It is here that Anatoliy Mikhaylovich Chistyakov, let us be frank, was not at his best. He seized firmly and paid tribute to the administrative command style.... And the people did not understand him. Not all the people, of course. But USSR State Prize winner V. Simonov also found himself among the slow-witted, when he learned that a place in the new structure of the institute had not been found for the division which he managed. But it was decided to establish in place of it a laboratory with broad research themes. And they had selected a manager of the laboratory—a doctor of sciences from another institute. While they offered engineer Simonov a rank and file position with the same salary. In response Vitaliy Ivanovich wrote a complaint to his own Ministry of Installation and Special Construction Work, went to a reception with A. Smirnov, chief of the association, but did not receive support. Then he also guessed that director Chistyakov was an illegal director who was not elected by the labor collective of the institute. And he decided to stand up for democracy.

But further the events developed in not at all a funny manner. Because the question: was the director appointed or elected, overshadowed everything else. And the new tasks, which had been set for the collective of the laboratory, began to skid. The staff members did not want to undertake them and did not wish to leave their customary job and to set out on a risky cruise over the rough waves of scientific research. They are also not bored with living that way.

Here A. Chistyakov should also have demonstrated his management abilities. He should have spoken with the collective and proved the necessity of changes. It is not

that way, Anatoliy Mikhaylovich let the situation go and began to rely on an administrative command style. He announced, as it was supposed to be according to the 1962 instructions, the competition for the filling of the vacant position of head of the laboratory. And although several people submitted documents for the competition, it did not require much effort to guess: the same doctor of sciences would be approved.

And then and there the collective of the laboratory retaliated. It opposed to the old instructions the new Law on the State Enterprise, which gives labor collectives powerful rights. And in full conformity with this Law it announced its own election of a head of the laboratory. Democracy was most strictly observed—they invited in advance the director, the secretary of the party buro, the chairman of the trade union committee, and the "Varangian," who was claiming this position—let him, they said, present his program, perhaps we will also elect him. And although all the named people ignored this invitation, the election was held—Vitaliy Ivanovich was approved by secret ballot.

But in a week the scientific and technical council of the institute held its own election, in which the same doctor of sciences won. So the laboratory, which was still not operating, had two managers. And both seem to have been elected legally: for no one had repealed the old instructions. It is then that director A. Chistyakov came to his senses and began in a hurry to change the administrative command style to a democratic style: he came to the labor collective of the laboratory to explain himself and invited A. Smirnov, chief of the Soyuzlegkonstruktsiya Association. For greater piety.

And they probably could have solved the problem. For V. Simonov and his collective are now doing much needed work. But if they change them over to scientific themes, will they manage? So the question was simple: find for this collective a place in the new structure, rouse it with the prospect of the maximum output. Only the talk was not about this. They discussed democracy: who was more legally elected—Simonov or Chistyakov. But inasmuch as none of those present, as it turned out, had a thorough grasp of the question and had a very clear idea of where democracy begins and demagogic ends, so they did not go so far as to say anything. They decided to adjourn until the fall, until the conference of the council of the labor collective. At that time both to specify the fate of the labor collective and to hold the election of the director in accordance with all the rules. Let democracy triumph. While the new tasks for the present will wait.

#### S&T Resources Diluted by Swollen Ranks of Ineffective Researchers

18140019 Moscow SOVETSKAYA ROSSIYA  
in Russian 10 Sep 88 p 3

[Article by Candidate of Economic Sciences Ye. Rodin, head of the Sector of the Forecasting of the Development of Maritime Transport of the State Planning, Design, and Scientific Research Institute of Maritime Transport of the USSR Ministry of the Maritime Fleet, under the rubric "The Rehabilitation of the Researcher" (Moscow): "The Institute Became Ripe for Reduction"]

[Text] I have once again reread the article "The Rehabilitation of the Researcher," which was published in SOVETSKAYA ROSSIYA on 19 June 1988. There ought to be more such specific articles, which are devoted to restructuring.

Indeed, in sectorial science there are very many superfluous people. This applies to scientists, to administrators, and to maintenance personnel. It seems to me that without detriment to the scientific and technical, economic, and social progress of our society it would probably be possible to reduce by one-half the number of people working in sectorial science and at the same time to decrease significantly the number of scientific research institutes and their affiliates and departments.

First of all this applies to Moscow. Correct is V. Kabaidze, general director of the Ivanovo Machine Tool Building Production Association imeni 50-letiya SSSR, who said at the 19th All-Union Conference of the CPSU: "I recently learned of a frightening figure: in the capital there are hundreds of thousands of scientific associates, and what is there here—an assemblage of child prodigies?" Unfortunately, there are few child prodigies, but there are very many people who are in science, yet in reality are performing the immediate functions of numerous ministries and departments.

For example, in Moscow there is the Soyuzmorniprojekt—the State Scientific Research, Planning, and Surveying Institute of Maritime Transport of the USSR Ministry of the Maritime Fleet. This institute has a surprising fate. Back in 1961, when this institute was considered only a planning and design institute, an article under the figurative title: "A Wharf on a Quiet Lane," was published in the newspaper IZVESTIYA. In the article doubt was heard: Is a planning institute of maritime transport needed in Moscow—hundreds and thousands of kilometers away from the objects of planning? The question raised by the newspaper had the following end: the Soyuzmorniprojekt was transformed from a planning and design institute into a scientific research, planning, and surveying institute, the Soyuzmorniprojekt.

The adopted decision was correct and timely. First, the affiliates of the Soyuzmorniprojekt (in Leningrad the Lenmorprojekt, in Odessa the Chernomorprojekt, in Baku the Kaspmorprojekt, and in Vladivostok the Dal'morprojekt) in both the planning and scientific respects were still weak and in many respects depended on the head institute, which was located in Moscow. Second, maritime transportation during these years was being developed rapidly and, accordingly, urgently needed planning and scientific support. The affiliates developed and grew strong. This was objectively governed by their proximity to enterprises of maritime transportation. The material and technical base, including the laboratory base, grew stronger, manning with skilled personnel took place. But meanwhile the positions of the Soyuzmorniprojekt in Moscow became weaker and weaker: a shortage of skilled personnel began—for in Moscow there are

no higher educational institutions, which train specialists for our sector, while it is practically impossible to attract them from enterprises, which are located in outlying areas. Further: the lack of a laboratory base, the difficulty of establishing direct ties with shipping companies, ports, ship repair facilities, and other enterprises of the sector, and so on began to cause alarm. All these things in connection with the changeover of maritime transportation to full cost accounting were aggravated even more.

Now the situation is as follows: the reorganization of the management of scientific, planning, and design organizations has been carried out in the system of the Ministry of the Maritime Fleet. By consolidating these organizations large integrated institutes were established: in Odessa the Southern Scientific Research Institute of the Maritime Fleet, in Leningrad the Central Scientific Research Institute of the Maritime Fleet, and in Vladivostok the Far Eastern Scientific Research Institute of the Maritime Fleet. Scientific subdivisions were transferred here from the affiliates of the Soyuzmorniiprojekt, that is, at present the Soyuzmorniiprojekt as the head institute has affiliates in Leningrad, Odessa, and Baku, which are engaged only in planning activity.

My length of service at the Soyuzmorniiprojekt comes to nearly 30 years. During all this time, in my opinion, the Soyuzmorniiprojekt was never so weak professionally and with respect to skills, the themes of the institute were never so vague and diverse. At the Soyuzmorniiprojekt there is everything, rather, there is a little of everything: a little planning, a little designing, a little technology, a little operation, a little management, a few automated control systems, a little economics, a few substantiations of the prospects of the development of the sector, a little technical and economic planning, a little international maritime shipping, a little hydraulic engineering research, and so on.

There is a little of everything, and nothing substantial. All this is not interconnected, there is no complex, but there is a conglomerate. Not by chance has the scientific and technical council of the institute not been able for 2 years now to establish in what priority research it should and can engage under the conditions of the restructuring of the management of the sector and given the existence of powerful institutes in the basins.

I am convinced: in Moscow an institute with such a composition and number of workers (about 700) is simply not needed. And it is obviously inadvisable to maintain this conglomerate at the expense of shipping companies and other enterprises of the sector.

It is amazing, but the output per worker (the labor productivity) during the past half a year at the Soyuzmorniiprojekt increased by 2.2-fold, the average wage increased by nearly 1.9-fold. Meanwhile the specific effectiveness of the developments of the institute is one

of the lowest in the Ministry of the Maritime Fleet; the most important jobs were not accepted and were returned for serious modification.

The situation with the planning subdivisions of the Soyuzmorniiprojekt is also no better. Vague, diverse themes, a quick increase of labor productivity and the average wage, the lack of a clear orientation in activity...are also characteristic of them.

It seems to me that it is time to draw the appropriate conclusions. And with respect to not only the Soyuzmorniiprojekt, but also other sectorial scientific research institutes and planning organizations. And first of all those in Moscow. Judicious reduction of such institutes and organizations and the release as a result of this of enormous assets and manpower resources are an important reserve of the acceleration of the economic and social development of the country.

#### Georgian Academy of Sciences Elects New Members

18140033a Tbilisi ZARYA VOSTOKA in Russian  
14 Jul 88 p 3

[Article: "From the Georgian SSR Academy of Sciences"]

[Text] In conformity with the announcement of 15 April 1988 on the holding of the election of members of the Georgian SSR Academy of Sciences full members and corresponding members of the Academy of Sciences, councils of scientific institutions and higher educational institutions, and state and public organizations nominated 60 candidate full members of the Georgian SSR Academy of Sciences and 307 candidate corresponding members of the Georgian SSR Academy of Sciences.

The General Assembly of the Georgian SSR Academy of Sciences on 12 July 1988 in conformity with the Charter elected the following scientists as full members of the Georgian SSR Academy of Sciences and corresponding members of the Georgian SSR Academy of Sciences:

#### Full Members of the Georgian SSR Academy of Sciences

##### The Mathematics and Physics Department

Nodar Sardionovich Amaglobeli Dzhumber Georgievich Lominadze Guram Levanovich Kharatishvili

##### The Earth Sciences Department

Merab Aleksandrovich Aleksidze Irakliy Petrovich Gamkrelidze

##### The Applied Mechanics, Machine Building, and Control Processes Department

Mikhail Vladimirovich Khvingiya

**The Chemistry and Chemical Technology Department**

Teymuraz Georgiyevich Andronikashvili Guram Georgiyevich Gvelesiani

**The Biology Department**

Malkaz Mikhaylovich Zaalishvili Georgiy Ivanovich Kvesitadze

**The Physiology and Experimental Medicine Department**

Bidzina Razhdanovich Naneyshvili

**The Social Sciences Department**

Yuriy Mikhaylovich Kacharava Shalva Vasilyevich Khidasheli

**The Language and Literature Department**

Konstantin Grigoryevich Tsereteli Georgiy Shalvovich Tsitsishvili

**Corresponding Members of the Georgian SSR Academy of Sciences**

**The Mathematics and Physics Department**

Dursun Osmanovich Baladze Nikolay Nikolayevich Vakhaniya Rolan Ilich Kiladze Mirian Alekseyevich Mestvirishvili Otar Dmitriyevich Tsereteli Nodar Levanovich Tsintsadze

**The Earth Sciences Department**

Guram Shalvovich Shengelaya

**The Applied Mechanics, Machine Building, and Control Processes Department**

Konstantin Petrovich Betaneli Iovel Yakintevich Dzhebashvili Merab Shalvovich Mikeladze Zurab Nikolayevich Tsilosani Gocha Georgiyevich Chogovadze

**The Chemistry and Chemical Technology Department**

Dzhondzo Ivanovich Dzhaparidze Irakliy Sergeyevich Zhordaniya Guri Benediktovich Tsagareyshvili Givi Okropirovich Chivadze

**The Biology Department**

Nugzar Georgiyevich Aleksidze Tengiz Georgievich Bendze Devi Shalvovich Ugrekhelidze Irakliy Yasonovich Eliava

**The Physiology and Experimental Medicine Department**

Vakhtang Mikhaylovich Mosidze Kiao Shalvovich Nadareyshvili Vakhtang Ignatyevich Pipiya Nugzar Irakliyevich Tatishvili

**The Problems of Agricultural Science Department**

Georgiy Nikolayevich Gugauri Otar Georgievich Natishvili Tengiz Fedorovich Urushadze

**The Social Sciences Department**

Levan Andreyevich Aleksidze Grigoriy Grigoryevich Giorgadze Sergey Monaseyevich Dzhorbenadze Parmen Parmaosovich Zakaraya Roin Viktorovich Metreveli David Levanovich Muskhelishvili Shota Aleksandrovich Nadirashvili Guram Veniaminovich Tevzadze Levan Aleksandrovich Chilashvili Vakhtang Mamiyevich Shamiladze

**The Language and Literature Department**

Aleksandr Akakiyevich Gvakhariya Rismag Veniaminovich Gordeziiani Elizbar Dmitriyevich Dzhavelidze Vissarion Arkadyevich Dzhorbenadze Nafi Grigoryevich Dzhusoiti

[Signed] President of the Georgian SSR Academy of Sciences A.N. Tavkhelidze

Academician Secretary of the Georgian SSR Academy of Sciences E.A. Sekhniashvili

**New Computer Programming, Service Cooperative Formed**

18140336 Moscow SOVETSKAYA ROSSIYA  
in Russian 9 Aug 88 p 2

[Article: "Cooperative Puts Together Computer Program. The 'Pronto' Effect"]

[Text] The All-Union Scientific Research Institute for Management Automation in Industry and the USSR Academy of Medical Sciences Presidium have taken steps to establish an engineering cooperative, the Center for Programming and Scientific and Technical Service (abbreviated "Pronto").

**Georgiy Genin, chairman of the cooperative center, candidate of economic sciences, relates its tasks:**

Today, it seems, no one needs to be convinced of the need to computerize any more. The fact that any developed society will enter the 21st century armed with improved computers is obvious. Work related to computerization is also turning around in our country. This process is not easy. For the time being, as before, the shortage of modern computer hardware is making itself felt. Many enterprises and organizations are trying to acquire a computer without the preliminary economic grounds, converting essentially progressive hardware into ordinary calculators. Taking into account the fact that there has been no well thought-out state policy in the area of computerization for a long time, thousands of computers of various generations and classes have been set up in the national economy—besides Soviet computers, there are also those produced in the GDR, Bulgaria, FRG, Japan, the United States, and Italy. Many problems arise: how can we connect them into a unified network and force them to work efficiently? In general, many computers lack the necessary software and, as before, there are not enough highly-skilled specialists in information science.

Computerization problems are being felt more sharply in the area of management (automating the work of ministries, departments and party committees) and in education, science, health care, book- and newspaper-publishing, trade, construction and other non-industrial sectors. These are the main focus of the "Pronto" engineering cooperative center's attention.

Leading specialists from institutes of the USSR Ministry of Instrument Building, Automation Facilities and Control Systems, the USSR Academy of Sciences and the USSR Academy of Medical Sciences have joined the cooperative. This includes not only mathematicians, programmers, and electronics experts, but also economists, sociologists and members of other professions. This is no accident. One of "Pronto's" main tasks is not only the creation and sale to clients of ready-made automatic "turnkey" systems, but also the efficient inclusion of computer hardware in the work process, ensuring a real economic effect. Therefore, any order

begins with an expert economic analysis. Considering the fact that today many enterprises and organizations are converting to cost-accounting, "Pronto" economists are developing recommendations for work under the conditions of the new economic mechanism and the introduction of internal cost-accounting.

Besides creating new information technologies, software products and designs for automated systems, the engineering cooperative center also deals with the repair and set-up of computers found in the balance of state enterprises and establishments, as well as in private use. The participation of the large Italian "Olivetti" company in "Pronto's" work contributes to handling this task.

A separate orientation of the center's work is the automation of health-care establishments.

A group of "Pronto" specialists are working to organize the training of all population groups for work on computers, including in enterprises—at work places and in schools. Special, efficient training methods were developed for this. Future plans include the creation of educational computer centers in different cities of the RSFSR.

We invite all specialists interested in developing computer hardware and information science to cooperate with "Pronto."

The center's address is: 119140, Moscow, ul. Sivashskaya, Dom 4, Korp. 2. Telephone: 119-88-04.

**EDITORS:** On "Pronto's" example, SOVETSKAYA ROSSIYA plans to look into how effective it is to create cooperatives in science and technology, as well as to discuss in detail the problems of introducing computers in management, health care, education, construction, journalism and other sectors. The problems of developing and producing domestic computer hardware will be studied. A separate discussion will be held on enterprises' experiences in converting to the new economic management conditions from the viewpoint of modern scientific requirements.

**USSR Supreme Soviet Attacks Lagging Computer Industry**

181400/18b Moscow IZVESTIYA in Russian  
15 Aug 88 p 2

[Article by IZVESTIYA special correspondent A. Ivakhnov: "Electronics: In Pursuit of Yesterday"]

[Text] At a regular meeting of the commissions for science and technology of the chambers of the USSR Supreme Soviet, the deputies had to evaluate the work of the USSR State Committee for Computer Technology and Information Science. N. Gorshkov, the committee's chairman, presented a report to the meeting's participants. His address consisted of a dull report written in the traditions of the pre-perestroika period.

But a coreport delivered by Academician V. Koptyug, the head of the joint preparatory commission, in the name of the deputies sounded in the hall like an alarm bell. Carefully going into the state of affairs in the localities and then exchanging opinions at preliminary meetings, the deputies came to the conclusion that the lag of our country behind the world level in production and use of computer equipment has reached a critical, strategically dangerous level, and this, despite the measures adopted in recent years, continues to grow.

Then a discussion started, and it became clear that the question included in the agenda, as one of the speakers said, was only the tip of an iceberg, which the immense complex of urgent problems actually was.

Without going into details, the picture presented in the coreport was as follows: the requirements of the national economy for computers is being satisfied by no more than 30 percent and for peripheral and other auxiliary equipment by only 10 percent. Plans for the production of these products are not balanced, are inadequate and in addition are still not being fulfilled. In terms of reliability, domestic computers cannot in any way be compared with those produced by leading capitalist firms. Scientific institutions have an acute shortage of supercomputers. The position in regard to medium-class machines is slightly better. Personal computers produced by different departments are not compatible with each other. An information transmission system has not been created, and there is practically nothing to "pump" to users, for we do not have data banks.

Electronic machines are an inseparable part of the electric power industry. In the sector, more than 5,000 different-level automated control systems are in operation. But today Deputy Minister A. Dyakov complained that one-fifth of this equipment has used up its service life and requires replacement. By 1995, the other four-fifths of the electronic equipment will be in the same condition. The sector is not getting in full the stated equipment, and modernization of power systems is threatened with disruption. Operators because of breakdowns in the operation of computers are not in a position to provide an economical and breakdown-free condition of operation for electric power stations. Plans are not being fulfilled for the introduction of centers for personnel training. The sector's designers can only dream of automated design.

Machine-tool building has its own problems. The sector will have to establish as soon as possible 800 flexible automated production facilities. To design them manually is basically impossible as about 400 automated work stations of medium productivity are required. But only 46 have been acquired. Deputy Minister I. Ordinartsev said.... We make machine tools with numerical control—we purchase all the electronics abroad for their delivery in developed countries. Hard currency is spent, and the

effectiveness of trade is sharply reduced. We also produce such electronics but in its case the operation lasts 170 hours before it goes out of order instead of the 10,000 hours achieved in world practice.

In the opinion of V. Mikhalevich, director of the Institute of Cybernetics of the UkrSSR Academy of Sciences, a most acute problem is our lack of electronic mail, which has become no less customary abroad than telephonic communication—in management, the service sphere and everyday life. People living on different continents maintain contact with its aid, exchange information and think jointly in the solution of complex problems. In the opinion of Deputy Ye. Velikhov, both the book and the pencil will largely be replaced by a home display connected to a library computer. There is no longer any doubt that everything is moving in that direction.

So Deputy V. Semenikhin asked the question whether the brains of our developers have fallen into decline or whether our technologists think more poorly than western ones. It is quite something else: our scientists and engineers in the presence of a stagnant economic mechanism and our even more bureaucratic system can provide little help. They need all-round support, including from those sectors which do not tire of complaining about unsatisfactory deliveries and the low quality of computer equipment.

Our planning organs do not seem to be able to part with gross indicators, and the result is, as Deputy V. Koptyug pointed out, that in the monetary sense the plan is seemingly being fulfilled, but in the products-list sense you have a complete catastrophe. Reports in monetary terms in no way express the true state of affairs. Goods are being produced that are far from prime necessities. At the same time, the production volume of storage disks and graph plotters fails to reach even half of what was planned. The USSR Academy of Sciences, Deputy Ye. Velikhov said, has been allocated 51 million rubles for the 5-year period for research in the field of computer technology. At the same time, foreign firms spend each year millions of dollars on these objectives. This situation must be radically changed. At the Ministry of Finance, Deputy A. Ishlinskii noted, they are unable to agree on electronics people using gold for contacts, for without it machines and instruments will not operate. The state spends so much money on repairs that with passage of time the machines become more expensive than if they were made of gold.

Chemists demand modern computers but they themselves are in no hurry to solve the problem of super-pure materials. The construction-materials sector does not provide electronics people with needed alumina used in the manufacture of housings [korpusy] for integrated circuits. And builders! At the rate with which they erect buildings of new plants, we shall not see the products of these enterprises even in the beginning of the next century. Can one be surprised under such conditions that

original developments in computer technology, in no way inferior to the foreign supercomputers of which V. Mikhaylevich spoke, have been unable for years to make it to series production!

"External" factors undoubtedly do not remove either responsibility or the weight of concerns with sectors engaged in the production of computers, peripheral equipment and components for this equipment. Judging by the statements made, this is well understood in most ministries.

In the electronics industry, attempts are being made to get the problem of product quality to make headway. In the opinion of Deputy Minister E. Ivanov, neither technical control nor even state acceptance help in its solution: they are only engaged in the selection of poor-quality products. Pretrade and guaranteed repairs, he said, are our shame, our disgrace. At two of the sector's enterprises, they tried to create a system of ensuring quality, but... they ran into resistance both by executants and managers of these collectives. This means that in addition to organizational measures major explanatory work is still needed. And Deputy A. Ishlinskiy added that it is necessary to concern oneself with reliable means of diagnosis and spare units which can effectively replace those going out of order.

Deputies V. Koptyug and Ye. Velikhov and Deputy Minister E. Ivanov directed the attention of the commissions to the unsatisfactory work of the Personal Computers Intersectoral Scientific and Technical Complex. The USSR Academy of Sciences and USSR Gosplan are not carrying out the decisions of directive organs on strengthening the material base of the intersectoral scientific and technical complex and boosting the efficiency of its work.

But let us return to the question recorded in the meeting's agenda. What is the opinion of the deputies on the first steps of the operation of the USSR State Committee for Computer Technology and Information Science? Without a doubt, the creation of the committee activated to a certain degree the whole complex of work along the line of its activity. It, however, in the opinion of Deputy Ye. Velikhov, is too slow in taking into its hands the reins of management. Deputies pointed out that the committee's efforts are now primarily aimed at the preparation of directive documents, but it displays little initiative in the realization of set targets and it is not exerting any perceptible influence on the technical level and quality of production. With the creation of the committee, USSR Gosplan turned over to it a significant portion of its functions. Today only two specialists are engaged in the planning committee on questions of computer technology, which, of course, contradicts both common sense and the actual idea that it is a central scientific-economic department. At the same time, the USSR State Committee for Computer Technology and

Information Science, as pointed out by Deputy A. Ishlinskiy, does not have any financial levers to exercise control over the most important operations, all of them being "scattered" among the ministries.

In the opinion of the deputies, the chief task of the USSR State Committee for Computer Technology and Information Science is to work for high quality, an advancing level of produced equipment and emergence on the world market. In this, it needs to rely more widely on the scientific and technical council in which the most important scientists and specialists have been assembled. It is necessary to expand the powers of the committee, to upgrade its status and to turn over funds to it for centralized financing of developments.

It is very important, Deputy I. Glebov said in concluding the meeting, to determine a strategic policy aimed at an accelerating development of domestic computer technology and information science, to work out a national program in this field and to strive for its incontestable realization. It would also be advantageous to examine the question on creation of a national-economic complex which would unite the sectors and implement a unified scientific and technical policy.

The concrete proposals of the deputies on overcoming the lag in this most important field of the economy were submitted to the directive organs.

**State Computer Committee Official on Computer Net Development Problems**  
*18140028 Moscow NTR: PROBLEMY I RESHENIYA*  
*in Russian No 15, 2-15 Aug 88 p 1, 4*

[Interview by F. Vladov with I.N. Bukreyev: "The Intricacies of Information Networks"]

[Text] Igor Nikolayevich, I would like to start our conversation with general questions. Everyone realizes that the period which the country is now undergoing is complex and critical. What, in your opinion, should be the role of computers in the social processes which are now occurring?

Without any exaggeration, I would say that it should play a large, perhaps, even definitive role. Today the words democratization and glasnost are some of the most often used. Yet, what is their essential meaning? I believe that it lies primarily in free access to the most extensive information.

One person needs all the information about Nagorno-Karabakh, another needs the documentation for a new machine tool. The first is doomed to a long visit to the library and lengthy consultations with specialists, while the second is faced with a mass of agreements, permits, "visas" and "seals." Meanwhile, the most democratic

way to solve the problem is to create, on the basis of computers, the necessary number of data banks, joined into a common network which anyone who wants to can access.

An enterprise or an individual, from his work place, home or even from a train station or movie theater—anywhere there is a terminal—could query for information immediately, without additional permits to obtain the necessary information. This ought to be today's level. Today the processes of informatization of society are taking precisely this direction in the world's developed countries.

#### Including here?

Here, unfortunately, these processes are in a rudimentary state for the time being. There are already thousands of data banks operating in the world, joined into a unified network. Yet there is a state automated network in the USSR, through which one can access any data bank... in Europe or the United States. However, there is no similar network within the country and also virtually no corresponding banks: all of this still remains to be created.

#### A question suggests itself: why it has turned out this way?

I could discuss this for a long time but, to put it briefly, it is the typical legacy of the period of stagnation, when words were preferable to action. Talk about the need for such a network has gone on for many years, but nonetheless neither a real customer, nor, moreover, an implementer was found for it. Only now has the GKVTI [State Committee for Computers and Information Science] taken this upon itself. Right now the necessary development work is being carried out, the advance design is being formed and the first-priority technical tasks are being drawn up.

I foresee your question about time periods, but for the time being I am in no condition to answer it. I can only report that we will prepare a government resolution on this problem. There everything will be assigned—the resources, implementers and, of course, time periods. We hope that it will come out sometime this year. However, until then it is not worth getting ahead of ourselves.

As far as I understand, the creation of powerful information networks is a difficult task. It requires large first-rate machines, the storers and organizers of information, small computers and "personal computers," which ensure network access, numerous peripherals and communications devices and, finally, the appropriate software. What is the state of affairs with all of this hardware?

Let us consider things in order, beginning with large computers. According to existing estimates, right now their supply is somewhere on the level of 30-40 percent of demand. This is our problem. Alas, it is unrealistic to

count on doubling their production by the end of the year. This doubling would occur only over a 5-year period. Moreover, the current 5-year period is characterized by the fact that computer generations are in a process of active change. Old ones are being taken out of production and new ones are going onto the production line. Therefore, doubling—in pieces—will not occur this time, although computer capabilities are expanding sharply, memory size and speed are increasing and other qualitative characteristics are improving and significantly approaching the world level.

In the next 5-year period, annual computer production will double again and these, understandably, will already be the new next generation computers. However, all the same the problem is not being solved even with their assistance. Our main hopes are placed on personal computers. After all, just what is a modern personal computer? It is a fairly powerful machine, not inferior and sometimes even superior to yesterday's large and medium-sized computers in terms of its capabilities. However, it fits on a desk and is at the user's personal disposal. Meanwhile, using IBM PS/2 computers, one can solve up to two-thirds of design and technological tasks, to say nothing of planning, finance, management and other problems. In other words, personal computers, having taken on the lion's share of the work, make it possible to unburden large computers.

#### Well, where are these remarkable personal computers?

In the same place as information networks! We have spent almost 9 years on the decision—only on the decision!—to make or not make personal computers. Someone was unsure of their usefulness, someone waited for special instructions... After all, in the 1970s we were still working to develop microprocessors, and these were 8-bit. Then 16-bit microprocessors came out here several years ago. However, these developments were intended for application in machine tools, automobiles, tractors—in short, anywhere you please except in a personal computer.

The appropriate decision was made only in 1986. By this time, millions of personal computers had already been produced in the West. Here, several interested ministries which had the necessary capabilities began independently, on their own initiative, so to speak, to manufacture their own microcomputer models, like some kind of departmental hobby.

Development work occurred beyond the provisions of the plan. Naturally, there were no standards whatsoever and each developer used and included anything it wanted in its own model. The result is understandable: the Minpribor "Iskra" is incompatible with the Minradio prom "YeS-1840," the "Elektronika-85" does not connect to the "Neyron," etc. It is also hard to blame anyone—after all, each worked for itself, without taking a look at possible partners.

For a long time there have been virtually no problems with computer incompatibility in Western countries. There one can buy, for instance, any type of American, French or Italian computer, connect them within a standard local network and, as nice as you please, they work—the computers "understand" each other excellently. Yet we put two Soviet computers next to each other and, shame to say, exert tremendous efforts in order to get them to interface with each other. Thus, compatibility is one of our most painful problems today.

**Is something being done to solve this problem?**

Of course. Above all, we had to clearly realize that there was no sense at all in thinking up an entirely original domestic personal computer—it is already too late. Throughout the world, the standards of "Big Blue," as the IBM Corporation is called in America, have gained the upper hand and virtually everything on the market today should be compatible with its products. Otherwise, one loses the possibility itself of interfacing computers. Therefore, one of our first steps was to establish a GOST for personal computers, based on international standards. It came out in 1987 and, naturally, not a single personal computer being produced at this moment—even now!—has complied with it. Insufficient reliability, low technological productivity (labor outlays comprised from 300 to 600 hours on the norm, instead of the prescribed 15-20!), and software and connection incompatibility—these are only some of the deviations from the adopted GOST.

Nevertheless, we decided to produce any computer—and somewhat more of them. It was necessary to somehow satisfy the demand for computers, to accustom people to the idea itself of the rapid penetration of personal computers into almost every work place for mental labor. The assignment for this 5-year period is 1,100,000 personal computers. Of these, approximately half are for instruction purposes (primarily the "Korvet" and "UKNTs" computers) and the rest are professional computers (the YeS-1840 and -1841, "Iskra 10-30", "Elektronika-85" and others).

Today about 200,000 such computers have been produced, i.e., almost a million more must be made by the end of the 5-year period. Because of non-compliance with the GOST, not all of these are being certified as high-quality production and are currently being manufactured by special permission from the GKVTI and Gosstandart, yet in the future they will be removed from production and replaced with modern models. Thus, today the "YeS-1842" personal computer is being intensively revised. This is a standardized powerful computer, the design and capabilities of which already more or less meet today's requirements. Its series production is being proposed for next year, for which a special plant is being built in Kishinev which is capable of manufacturing up to half a million such computers annually.

I will not dwell in detail on the actual personal computers—I will only say that we are considering about one and a half dozen models, of which several of the best should be selected, based on competitive principles, revised and put into production. There is also a problem with peripherals and communications devices. Here the situation is even more complex: one item exists, another is in very short supply, and there is great disparity in the quality of different units: some can work together, but for others, as we have said, "configuration" presents a difficult and sometimes unsolvable problem.

I do not want to make excuses, but I think it must be emphasized that all of this was left as an inheritance for us from previous disjointed and stagnant times. The GKVTI was formally created only 2 years ago, but it actually began operating only a little more than a year ago. The first thing we ran into is the lack of standardized information about what is being done in the country in the area of computer equipment.

Several billion rubles allocated for its development by the state budget have been scattered among various ministries and departments, where their tracks are often lost. Several departments, especially those involving closed subjects, in the best case reported about a tenth of their research in the area of computer hardware and even those did not trouble themselves with details. Therefore, information about what kind of, where and by whom research is being done in the country was catastrophically inadequate before the appearance of GKVTI.

First, we managed to compile a complete list of the research and industrial development work being done in the area of computers, and this was the starting point for our activities. The next stage was a unique "screening" of all the items on the list in order to evaluate the significance of each, to reveal redundant directions and, perhaps the main point, to discover the "blank spots" covered by no one.

**When all of this was finished, were you finally able, like a basic customer, to genuinely coordinate the work of numerous departments and enterprises?**

If only! You used a good word—customer: we really are this only formally. However, I emphasize—formally. After all, just what is a real customer? It is the one who has real, best of all economic, levers for influencing the implementer at his disposal. To put it simply, it is the one who pays. Yet we do not pay! Currently, we have no such possibility. They are not giving us funds for computer hardware; we do not distribute funds among the sectors and so, naturally, we do not control their utilization.

This situation is entirely abnormal and we, of course have been sending corresponding proposals to various higher authorities for a long time. The most interesting

thing is that everyone, it seems, is in favor of it! At least, neither Gosplan, Minfin, nor Sovmin is refusing us. However, after all, meanwhile they are also not permitting us!

Since we have no money, all possible measures of moral influence must be used. However, whereas previously this actually worked somewhat, now, when cost-accounting either has already been introduced or is just starting to appear everywhere, such things are simply not being taken seriously. One can understand the enterprises: they are no longer able to work "for free," since they have to take care of themselves. Therefore, they tell us: "If you want us to work for you, pay us, and if not, please excuse us." By next January, cost-accounting will be introduced virtually everywhere and if resources have not been given to us by then (in fact, we already need them now, while next year's plans are being drawn up), the situation could become simply tragic.

Igor Nikolayevich, until now we have discussed essentially hardware, "metal," so to speak. What is the state of affairs with software, without which, as everyone knows, any computer is simply a hunk of metal and plastic?

To start with, I will make a comparison. Last year 52 billion dollars were spent in the U.S. on hardware and 27 billion—more than half—on software. Until recently, our outlays for software did not exceed 1.5-2 percent of overall outlays for computer hardware. In my opinion, this correlation is murderous. One of the state committee's most important tasks today is to change it, to bring the volume of the software products up to even a fourth of the cost of computers.

#### How do you intend to solve this problem?

Yet another correlation is not without interest. About 700,000 programmers work in America, while we have about 300,000. It seems as if the difference is not so great. However, the productivity of American specialists is higher by a factor of 5-6. Due to what? Primarily due to the extensive use of improved software engineering and modern software tools. Our programmers often work "manually," using pencil and paper. Moreover, they are scattered among a number of unrelated organizations, working in isolation from each other, and spend a great deal of time overcoming the already-mentioned software compatibility barriers. Finally, redundancy is flourishing on an enormous scale. In a country where there are only two systems for book-keeping, thousands (without exaggeration!) of book-keeping programs have been created and, after all, programmers' efforts and time were spent on each of them.

The reasons here are the same as before: all of this is amateurism on a state scale, of which we must free ourselves as rapidly as possible. The State Software System (GSPO) should be the solution. A new sector must be created in the country—a software industry.

A special governmental resolution on GSPO was passed this April. At this point in time, base production and scientific production associations have been established on the basis of 144 enterprises in 26 regions of the country which had been transferred to GKVTI. Their most important task is to provide information service for any users in the region, primarily information network access and the creation of applied program packages.

The center of each association is formed by a large collective use computer center, and the State Inventory of Algorithms and Programs (GOSFAP) should become the nucleus of the entire system, where everything created in these regions will be accumulated. Actually, GOSFAP did exist previously, but was a sort of software graveyard. It ought to be alive, operating very dynamically, like a continually renewing organism which, on a commercial cost-accounting basis, will constantly cooperate with regional centers and, through them, directly with users, trading in badly needed software.

One last question: GKVTI's work has been criticized many times in newspaper articles and on radio and television, and dissatisfaction with its work has been voiced. How do you relate to this?

In two ways. On the one hand, criticism, particularly constructive, is always useful, and poor would be a leader who does not know how to use it to help the situation. However, on the other hand, this criticism, unfortunately, is not always sufficiently competent. Then I think it would be nice to put one of the critics in my shoes, if even for a week, and watch... After all, "everyone thinks he is a strategist, watching the battle from the sidelines."

It is particularly offensive when these articles are written by people who have thoroughly investigated the technical issues of creating and using computers, but poorly imagine the organizational aspect of the problem and our true resources and capabilities. Here, I see only one answer: extensive glasnost about GKVTI's work is necessary. As one of its first-priority measures, in the immediate future we suggest starting the practice of holding topic-oriented press conferences, the participants in which will be given extensive information on all aspects of our activity.

#### Soviet Official Estimates Computer Lag at Four to Twelve Years

18140029b Moscow NTR: PROBLEMY I RESHENIYA  
No 15, 2-15 Aug 88 p 5

[Interview by S. Abramov and I. Oleynik, candidates of economic sciences, with Dr. Zoltan Sabo: "Administration is Incompatible with Business Flexibility." Passages in boldface as published]

[Text] "Tertia" in Budapest is the leading Hungarian association for the production of peripheral equipment, computers, and communication devices. Its contribution to

**the development of Soviet-Hungarian cooperation in the electronization of the national economy is weighty and its role in computerizing the country's economy is significant. The available reserves in these areas is the topic of this discussion between Z. Sabo, head of the association's scientific research department, and our correspondents.**

**How successfully, in your opinion, is computer hardware being developed in CEMA-member countries?**

Let us start with the fact that since the mid-1960s more than 500 modern hardware and software systems, which are part of the Unified System and SM computers and a number of personal computers, have been created and are being produced in these countries.

Meanwhile, unfortunately, the quantity of computer hardware being produced has not turned into quality. According to the most optimistic estimates, our lag behind the West comprises from 4 to 12 years. One could consider the acquisition of one of the YeS [Unified System] computer models by a computer hardware museum in England a curiosity.

**What is hindering the rapid development of computer hardware in the socialist countries? After all, it would seem, all the conditions for a dash forward exist: resources, cadres, a production base...**

Yes, in fact, the available scientific-production potential is enormous, but, in my opinion, it is being utilized ineffectively. There are many problems here, so I will consider only the two most important ones.

Primarily large scientific research institutes, working on the basis of long-term plans, are participating in implementing the Comprehensive Program for Scientific and Technical Progress in the Electronization of the National Economy by the Year 2000. Special meetings are held in order to coordinate them, but the correction process itself is very difficult and prolonged.

As a result, we are not managing to react immediately to the changes which occur in computer hardware literally every day. Meanwhile, we are meeting, changing the program, obtaining additional resources, etc...

Moreover, we are virtually not involving small creative collectives, to whose credit are developments which are often not inferior to foreign analogs, in this program. How often we find out that some group of enthusiasts have assembled, for example, a new personal computer. However, as a rule, everything ends here. No one takes up its industrial assimilation.

The head scientific research institutes do not view these home-grown competitors with much favor and do not even try to utilize essentially free technical ideas and developments. They are monopolists in their own fields, with all the ensuing consequences. I will not even mention the exchange of ideas, that arise behind the walls of

leading institutes, or the creation of introduction groups, within the framework of CEMA. There are too many barriers: departmental, national, inter-governmental...

**What is the solution?**

The solution lies in extensive and open competitive design, and in this regard I agree with F. Shirokov (NTR No 8, 1988). It lies in granting groups of enthusiasts an opportunity to test their strengths not only in inventing, but also in organizing computer hardware production facilities.

For example, your cooperatives and ours would be able to participate most actively in this. Jointly, as they say, at one's own risk, they could organize the production and sale of promising scientific developments. Interested organizations and innovative societies like "Novotreyd" (NTR No 6, 1988) would be able to take the financing of such cooperative enterprises upon themselves. This form of work organization is used quite extensively in the West. Incidentally, it is precisely small innovative companies that have developed and are producing today's popular personal computers, such as the Apple and Atari, and have created a number of applied programs for them.

I am saying this in order to make it clear that if we wish to catch up to the West in computer hardware, we must most decisively abandon obsolete and ineffective systems for organizing and financing work.

**You mentioned two problems which complicate the development of computer hardware...**

Yes, the second problem is technology. The components with which our computers are designed cannot stand up to any criticism whatsoever. There are too many defective products and deviations from standards.

Let me cite an example. Several years ago in the city of Vats a specialized plant was built to manufacture printed circuit boards. However, to this day its products do not conform to a world level. The cause for this is failure to observe technology. At the same time, similar printed circuit boards are being produced by small cooperatives, under far worse production conditions, which exceed the plant's in terms of quality.

This situation, while strange at first glance, is the result of the imperfection of our economic mechanism, as well as the monopoly position, which is being preserved, of the large enterprises that manufacture electronic components. In my opinion, it is virtually impossible to achieve quality under monopoly conditions, even if socialist.

**How successfully is the computerization process being developed in Hungary?**

In spite of several problems (where are there none?), computerization in our country, particularly in recent years, is developing ever more successfully. Perhaps, even better than in other socialist countries.

Today the Hungarian electronics industry is one of our most rapidly developing sectors. The output and implementation of its production is increasing by 10 percent annually and sometimes by even more.

Computer hardware has been installed in the majority of enterprises and organizations. Practically all secondary schools have several Hungarian personal computers valued at about 1,000 rubles each. I think it would interest you to know that computer classes are often created using the resources of near-by enterprises and cooperatives, which justifiably consider school computerization one of the methods for training skilled work cadres.

Almost every Hungarian can purchase a relatively inexpensive personal computer. Most of all, we have achieved software compatibility with the IBM PC, Commodore, Videoton and others.

Please do not think that I am trying to embellish our achievements. I agree with the London ECONOMIST, which wrote that "Hungary is one of the best producers of software in Europe... The M-PROLOG logical programming language, developed by Hungarian specialists, was chosen by Japan for use in fifth generation computers with artificial intelligence."

**How great is Hungary's dependence on imported computer hardware, and what problems exist in this area?**

Until recently, an important source of computer hardware, especially personal computers, was so-called "pocket importation," through which up to 40 percent of computers and spare parts were imported annually. Later, this was carried out through commission store trade.

However, as of January 1988 customs instructions have gone into effect which forbid private individuals from selling through commission stores or leasing computer hardware valued at over 25,000 forints (1,500 rubles) for 3 years. The importation of this hardware has dropped sharply as a result.

True, even here Western entrepreneurs have found a solution. They began putting together blocks, from which one can assemble, without particular difficulty, as though with children's blocks, a personal computer valued at 24,000 forints, especially for Hungarians, so to speak.

I think that any restrictions on the import of computer equipment must be removed, as, for example, has been done in Poland and Czechoslovakia. Moreover, it would

make sense to encourage this "pocket importation," since in the final account both the state, the enterprises and private individuals only benefit from this.

**One last question: what must be changed in Soviet-Hungarian ties with regard to the development of electronics?**

Many problems are characteristic not only of our countries, but also of the entire community. Thus, I will try to point out the main ones.

Since we are a purchasing configured items in the West, the convertibility of the ruble is a "painful" question for us. This subject could be discussed further, but it seems to me that it is time to make some decisions to remove this obstacle.

To continue on economic problems, there is the problem of price-setting. It is no secret that the establishment of prices for our electronics according to similar foreign models leads to overly high prices, yet the technical and economic parameters, to put it lightly, differ from Western ones.

Thus, many problems face us, but, given the mutual desire of all parties, they can and should be resolved. For our part, in any event, we are devoting all of our efforts to this.

#### **Compatibility Problems Plague Automation Efforts**

*18140029a Moscow NTR: PROBLEMY I RESHENIYA in Russian No 15, 2-15 Aug 88 p 5*

[Article by D. Ogorodnikov, engineer: "Module + Module = ?" Passages in boldface as published]

[Text] The sharp and, unfortunately, belated discussion in the press about problems with personal computers (NTR No's 1, 8 1988) has, of course, called for cooperation in working out a unified state technical policy in the field of personal computers. However, the main problem of the discussion, hardware and software compatibility, is no less serious in other areas of application of computer equipment as well. The incompatibility of technical automation equipment has been endured by workers in ASNI, ASUTP [Automated Process Control Systems] and CIM just as sharply as personal computer incompatibility for at least the last decade.

The implementation of modular bus systems (MBS) has become the development tendency in technical automation equipment, which uses computer equipment both throughout the world, as well as in domestic practice. MBS is a modular aggregate of devices which connect computer equipment with the objects of automation, communications devices (including information networks) and software, developed as a whole.

The structure of such an MBS should include hundreds of modules, by catalogue. For example, the creators of the MULTIBUS-1 system and standard, developed in the United States in the 1970s, are producing in series a so-called base MBS complex—about 300 modules which provide the user with computer resources which are compatible with a complete set of peripheral devices and with the standard modular base for mass applications. About 200 satellite companies, located near electronics, automobile, aviation and other industrial companies, are series producing "problem-oriented" modules, intended for connection to sensors and effector devices. For example, this makes it possible, according to a standardized catalogue, to configure ASNI, ASUTP and CIM systems of the required structure and scale, while guaranteeing complete hardware and software compatibility of these complexes no matter who produced the equipment.

Abroad, equipment using the MULTIBUS-1 standard today holds more than a third of the instrument market for MBS equipment (incidentally, our country has everything necessary to create a similar system). Recently, a successive modular bus system, MULTIBUS-2, has come out and is conquering the market. It is competing with equipment which uses the functionally similar BMI standard (developed by the U.S. company Motorola a decade ago), and actively supplanting it in the market. According to forecasts by foreign experts, by the mid-1990s the latter two MBS will be equal in terms of use and will hold 70 percent of the market, having displaced about 10 other MBS standards into the remaining part of the market.

Such forecasts attest to the coming of a qualitatively new stage abroad in the development of industrial electronics, for which the increased word length of the microprocessors used in MBS, the introduction of intensive inter-processor exchanges and the standardization of MBS software are characteristic.

The basic components for creating modern MBS are the very same 32-bit microprocessors on the basis of which personal computers are also being developed. At the same time, the standards themselves presume the use of any of these microprocessors within the limits of each of the systems.

In evaluating the trends and prospects for MBS development, it is impossible not to consider yet another aspect of the problem—the economic aspect. The fact that modules included in an MBS structure are inexpensive, and given their equivalent computing capabilities, are significantly cheaper than a personal computer, is extremely important. Yet their utilization provides a surprising economic effect. Thus, in an elementary particle accelerator in Batavia (United States), by executing tasks in parallel and organizing inter-processor exchange among 32-bit modules, they have successfully formed computer resources comparable to those of a Cray-1 computer system, with an equipment cost less than that of this supercomputer by a factor of 100.

There is nothing similar in domestic practice. In the USSR numerous world and sectorial level MBS standards are operating. However, not even the diversity of obsolete, mutually incompatible and functionally incomplete MBS architectures, along with the shortage of any of these systems, characterizes the situation in the country with automation equipment for industry and scientific research. The situation is even more depressing. The most wide-spread phenomenon in this area is time-serving. The intellectual resources of an enormous army of electronics engineers are being scattered in an effort, at any price, beyond any standards, to connect the available computer equipment to the objects of automation. It is good, if devices for interfacing with the object were stipulated in the computer configuration and purchased. However, these are also in short supply, particularly if one does not take into account the still significant share of hopelessly obsolete relay (i.e., without microprocessors) controls.

The situation is aggravated by the fact that the complexity of tasks in the area of automating the technical environment is continually increasing. Equipment is persistently developing in the direction of technologies with the prefix "super"—super-fast, super-pure, super-precise, super-reliable, etc. However, any "super", naturally, only increases the demands on the automation equipment. The age of powerful processing and parallel computing is not far away. "Intelligence" is being used in most modules, i.e., one must convert from the ordinary ADC (analog to digital converters) to an ADC with a microprocessor, a developed memory, and packet transmission of pre-processed data. This also requires effective network facilities, which ensure inter-processor exchange not only within the limits of one equipment rack, but also over considerable distances—within the limits of an enterprise or even groups of enterprises.

Only an optimal development strategy for domestic modular bus systems can lead to a happy outcome. Yet, it will be optimal only after the Gordian knot of immediate departmental interests is cut. However, for the time being neither Minpribor, Minradioprom nor Minelektronprom are coping with the tasks of automation (regardless of Goskomstat's victorious reports which appear once per quarter). In order to guarantee saturation of the domestic market with automation equipment, it would be expedient to master a minimum number of standards, ideally no more than two. Equipment based on the selected standards should interface with the entire diversity of microprocessor-based automation hardware previously created and currently being produced. This social order will make it possible to concentrate the efforts of equipment developers as well as of the creators of microprocessor units, to eliminate disunified parallelism in development and to limit the scattering of material and intellectual resources.

According to estimates by foreign experts, the production volumes of MBS hardware in future years will be equal on an order of magnitude to personal computer production volumes. The growth rates for microprocessor-based automation hardware production are such that it could be possible for their production volume to exceed that of personal computers by the end of the century.

In developing promising MBS, it must be taken into consideration that an MBS structure should also include a complex of communication devices for the creation of territorially distributed automation systems. The final form of such a complex might be an institute or industrial enterprise, equipped with units, robots, CNC machine-tools, automatic production lines, flexible manufacturing systems and ASU with all of its subsystems, connected into an integrated structure. In other words, MBS mandatorily includes the elements of local computer networks. However, network structures, like MBS, are developed within the framework of world-level standards, and today the generally-accepted industrial system of standards for local computer networks is the MAP/TOP (Manufacturing Automation Protocol/Technical and Office Protocol). Its introduction, following the United States, West Europe and Japan, is being

started in the USSR and CEMA countries, since designing networks without taking these standards into account renders them utterly unable to compete on the world market.

Today, these trends should be of concern both to the industry leadership, as well as to the engineering corps working in the field of automation. The developers and producers of personal computers and modular bus systems must scramble out of the abyss of incompatibility together, arms linked, relying on sensible solutions in the areas of microprocessor development, production and use. If this does not happen, the reality of the plans outlined by party and state resolutions to automate industry and scientific research will remain problematical.

**EDITORS:** As the International Center for Scientific and Technical Information (MTsNTI) has informed us, at the end of January 1989 an intensive course of instruction and transfer of technical knowledge on local MAP/TOP networks will be held in Suzdal by MTsNTI, jointly with the Ivanovo "Informatika" Scientific Production Association. Those who wish to participate in this course should send their inquiries before 20 August to the MTsNTI Computer Center: 125252 Moscow, Kuusinen Street, 21 B.

**Statute on Temporary Collectives for Introducing  
New Technology**

18140014 Moscow BYULLESEN NORMATIVNYKH  
AKTOV MINISTERSTV I VEDOMSTV SSSR  
in Russian No 7, Jul 88 pp 21-23

[Statute on the Establishment and the Support of the Activity of Temporary Creative Collectives for the Introduction in the National Economy of Promising Developments of Innovators Attached to Organizations of the All-Union Society of Inventors and Efficiency Experts and Scientific and Technical Societies, Approved by Decree No 440 of the USSR State Committee for Science and Technology, the USSR State Planning Committee, the USSR State Committee for Labor and Social Problems, the USSR Ministry of Finance, and the All-Union Central Council of Trade Unions of 25 November 1987]

[Text] 1. Temporary creative collectives are established for the purposes of the more efficient use of manpower resources and the creative potential of the working people, the rapid introduction in production of promising developments, inventions, and highly effective efficiency proposals, and the provision of intermediary services, which are aimed at the intensification of the national economy, by a decision (decree) of the corresponding organs, under which they have been established.

2. The councils (boards) and organizations of the All-Union Society of Inventors and Efficiency Experts (VOIR) and scientific and technical societies (NTO's) conclude on a cost accounting basis contracts for the performance of research, development, and other intermediary services with state enterprises (associations), other organizations regardless of their departmental affiliation, cooperatives, as well as private individuals and establish for the performance of the operations, which are envisaged by these contacts, temporary creative collectives (VTK's).

3. Temporary creative collectives are formed of skilled specialists, engineers, economists, and scientists, who are members of the All-Union Society of Inventors and Efficiency Experts and scientific and technical societies, on the recommendation of the councils (boards) and organizations of the named societies.

4. The temporary creative collective carries out its activity on the basis of turnkey contracts with the council (board) and organization of the All-Union Society of Inventors and Efficiency Experts and scientific and technical societies, in which the object of the assigned work, the work plan, the deadline of its completion, the special requirements, the procedure of the transfer and acceptance of completed work, the mutual responsibility of the parties, and other conditions are specified.

The client organization (enterprise) provides the temporary creative collective with the equipment, materials, components, apparatus, and other services, which are

necessary for the completion of the jobs, in conformity with the contracts which have been concluded by the councils (boards) of the All-Union Society of Inventors and Efficiency Experts and scientific and technical societies with the clients of the jobs.

The members of the temporary creative collective carry out development during time off from their basic job.

The participation of specialists, engineers, economists, and scientists in the activity of temporary collectives is not the combining of jobs.

5. The day-to-day management of the activity of the temporary creative collective is assigned to its manager, who is elected at the general assembly of the members of the temporary creative collective and is approved by the corresponding council (board) of the All-Union Society of Inventors and Efficiency Experts and the scientific and technical society.

The manager of the temporary creative collective organizes all the work and bears full responsibility for the activity of the temporary creative collective and the results of its work. The councils (boards) of the All-Union Society of Inventors and Efficiency Experts or scientific and technical societies, under which they have been established, carry out the scientific methods supervision and the monitoring of the activity of the temporary creative collective.

6. Expulsion from the members of the temporary creative collective is carried out at the general assembly of the temporary creative collective by a majority of votes and is approved by the organization, which established this collective, or on the decision of the corresponding council of the All-Union Society of Inventors and Efficiency Experts and scientific and technical societies.

7. The total time of the completion by the temporary creative collective of a development, as a rule, should not exceed 12 months.

8. The activity of the temporary creative collective is halted upon the expiration of the term of effect of the contract or in case of the early high-quality completion by it of the jobs, as well as in case of the obtaining of a negative result or in case of the establishment of the inability of the members of the temporary creative collective to complete the tasks assigned to them. The elimination of the temporary creative collective is made official by the corresponding decree of the presidium of the council (board) and by the order on the organization of the All-Union Society of Inventors and Efficiency Experts and scientific and technical societies.

9. The managers of the enterprise, which is the client of the jobs, bear responsibility for the urgency and the degree of analysis of the technical assignment and for the acceptance and production assimilation (practical use) of the results.

10. Expert commissions made up of highly skilled specialists can be established by the council (board) and the organization of the All-Union Society of Inventors and Efficiency Experts and scientific and technical societies for the determination of the amount and cost of the work on the orders, which have been received from client enterprises, for the acceptance of a completed job, for the evaluation of the quality and completeness of the performance of the job, as well as for the determination of the promise of developments.

The expert commission:

- evaluates the complexity of the posed task and the amount of work;
- ascertains the necessity of a patent analysis;
- estimates the anticipated economic impact in the national economy from the use of the results of the solution of a scientific and technical problem;
- after the completion of a development issues a conclusion on its scientific and technical level, on the technical and economic results, and on the conformity to state standards, specifications, specimens, conditions, deadlines, and regulations.

11. The completed development is transferred to the client, who is obliged to examine it within the time stipulated by standard documents. The transfer of the results of scientific and technical or design work to the client enterprise is registered by a bilateral acceptance certificate.

In case of the performance of scientific and technical and design work in accordance with economic contracts with client enterprises the temporary creative collective bears responsibility for its completion within the established time and for the reliability and quality of the obtained results.

Payment for the scientific and technical product, services, and other work, which are performed by the temporary creative collective in the interests of the client, is made at contract prices. The prices for scientific

research, planning, design, and technological work, experimental output, scientific and technical services, and other types of work are submitted for approval to the client prior to the start of the work subject to the required efficiency, quality, and time of completion of the work.

If the work is halted through the fault of the client, it is paid for by him in accordance with the actually made labor, financial, and material expenditures with the level of profitability, which is envisaged in the price for this work.

12. The financing of the work, which is being performed by organizations of the All-Union Society of Inventors and Efficiency Experts and scientific and technical societies with the assistance of temporary creative collectives, is carried out from the assets of the client, as well as credits of banks. Settlement is made after the completion of the work, within a 2-week period from the moment of the signing of the acceptance certificate.

13. The remuneration of the labor of the members of temporary creative collectives is carried out at the expense of the assets of the client, which have been transferred to the councils (boards) of the All-Union Society of Inventors and Efficiency Experts or scientific and technical societies for the work completed in accordance with the economic contracts, less the expenses for raw materials, materials, amortization, and payment for the services of outside organizations, transportation expenses and the expenses for the use of bank credit, the contributions for state social insurance, the income tax in accordance with established procedure, as well as deductions for the councils (boards) of the All-Union Society of Inventors and Efficiency Experts and scientific and technical societies in accordance with standards that were established in advance. The amount of the wage of each member of the temporary creative collective is determined independently by the temporary creative collective in conformity with the quantity and quality of labor and the personal contribution to the creation of income and is taxed in accordance with established procedure.

**Role of MNTK's in International Agreements**  
*18140321 Moscow NTR: PROBLEMY I RESHENIYA*  
*in Russian No 11, 7-20 Jun 88 pp 1, 6*

[Interview by V. Baronin with Vladimir Viktorovich Simakov, head, USSR Gosplan Combined Department for Scientific and Technical Progress: "Not the Fashion, but the Method." Passages in boldface as published]

**[Text]** Having the right to independent access to the world market and actively using it are far from one and the same thing. This was the question raised at a meeting of MNTK representatives, the All-Union Chamber of Trade and Industry, "Litzenzintorg" and other organizations, organized by the USSR Gosplan Combined Department for Scientific and Technical Progress, held several days ago. V.V. Simakov, head of this department, discusses the results of this meeting with our correspondent.

Vladimir Viktorovich, whether we like it or not, one sometimes gets the impression that the country is going through a unique conference boom. Yet, attend any conference and you see that everything said there has been known for a long time and has been stated and restated. Therefore, I would like to know why the meeting organized by your department was necessary?

In my view, the abundance of conferences, symposiums and meetings is an entirely normal phenomenon at this stage of restructuring in our country. The new realities of our life require their own interpretation. After all, in order not to drown in words, it is a problem of leading the conversation towards work and about work and, after investigating something, acting. As far as our meeting is concerned, we invited representatives only of those MNTKs which have some experience in work in the foreign market and, of course, specialists in foreign economic relations.

It would have been difficult to expand the circle of participants in the discussion. However, in this case, we would have obtained a unique "veche": some know the work, others have heard about it, and the rest are from another area in general.

The circle of participants in the discussion was also determined by an entirely specific task: we needed to analyze the course of fulfillment of the Soviet-West German agreement on scientific and technical cooperation, signed in June 1986.

**What did you succeed in discovering?**

Let us begin with the most obvious and simple things. They were not expecting us, so to speak, in the world market. This is the first point.

Secondly, it is ineffective to attempt to edge our way into it with traditional products. What did we offer? Tape recorders made in Kharkov or Riga, automobiles which far from all countries will allow on the roads because of

toxic emissions, and machine-tools which, without imported pneumatics, electronics control systems and software, cost no more than the metal used to manufacture them? All of this is commercially unprofitable. We must also take into account the basic feature of the contemporary world market: small, but rapidly developing trade and industrial firms set the tone within it. As opposed to slow-moving giants, in a short time they evaluate potential needs and organize cooperation and the production and sale of the latest products.

The FRG market, for example, is like this. The first session of the Joint Commission within the framework of the above-mentioned agreement was held in this republic's capital this April. It was a question of fulfilling agreements which were made on the use of nuclear energy for peaceful purposes, agricultural research, health-care and medical science and on expanding cooperation in the study and use of space, as well as in computer hardware and information technology. Our partners expressed great interest in cooperating in high-temperature superconductivity, medicine, and technological processes which make it possible to preserve the surrounding environment, and on joint development work on applied and basic research and on standards for high resolution television broadcasting.

As you see, it was basically a question of science-intensive production. A similar picture would be obtained in analyzing the market of any highly-developed country and the world market on the whole. In other words: it should be a question of products which do not exist and have not existed on the world market, and moreover, of work on the basis of contracts, which include maintenance services throughout the entire life cycle—from installation and repair to replacement with the latest new modification.

Vladimir Viktorovich, in order to offer our partners science-intensive products, we must, as a minimum, have serious scientific undertakings. Do these exist?

Unquestionably, although it is hard to say that they are particularly abundant. Let us turn to that which was discussed at our meeting. Tests have been performed in the FRG and Canada on a fundamentally new welding wire, created by the Institute of Electronic Welding imeni Ye.O. Paton. Moreover, prototype models of a new type of coal combine, capable of working in small seams (less than a meter), have been created jointly with the West German "Khimshay" company. On the basis of Soviet technical solutions, a new converter which can work on 100 percent scrap was built jointly with the Krupp Company. The problem of studying the possibilities for implementing two developments of the USSR Academy of Sciences Siberian Department Institute of Physics of Strength and Material Sciences by "Litzenzintorg" was literally solved at our meeting. Thus, there are possibilities for the adequate representation of our

country on the world market. It is another matter, whether or not we fully utilize the commercial opportunities which are opening up.

**What is getting in the way?**

This may seem trite, but effective MNTK work is being obstructed by the legacy of command-volitional management methods, the regulation of everything and anything, which have still not been completely overcome. An elementary factor, one would think, is that previously all foreign-trade operations were conducted through the appropriate associations of the USSR Ministry of Foreign Trade. As a result, having gained the right to independent access to the world market, the MNTK lacks the corresponding cadres. Moreover, this market has been organized in a certain way and one cannot appear in it, so to speak, as a private person: you should represent someone—in short, a professional infrastructure is needed. This does not exist and not a single MNTK has been able to create it in a short period of time. I will scarcely even mention the fact that, even with hard currency funds at its disposal, a complex cannot independently send its own specialist to an international exhibit, meeting, symposium... The permission of some higher organization is required. There is also the problem of so-called secret topics! In general, frequently that which both we and they know is secret, but that which they know and we do not is super-secret. Add to this the position of foreign-trade banks, which to this day are oriented towards bringing in hard currency and keeping it to the last, instead of providing credit for conducting a profitable, but also risky, operation, and the picture of difficulties will be clear. As you see, there are plenty of obstructions and difficulties. There are also many problems with hard currency deductions. For precisely this reason it is sometimes more profitable for an MNTK to sell paper licenses and not to organize production jointly with industry, including with foreign partners, on the basis of which it would be possible to supply production for the markets in third world countries.

**What can Gosplan and your department, in particular, do in this respect?**

As far as our department, as a part of Gosplan, is concerned, we are trying not to regulate everything and anything, not to forbid, as was done earlier, but to help those who want to and know how to work join forces with the GKNT, the Chamber of Commerce in its new form, "Litsenziorg," and other departments. We consider it our duty to regulate the course of actions in restructuring scientific management, to analyze the effectiveness and adequacy of resolutions made in this area, and to concretize the spirit and letter of documents which offer an opportunity to raise the effectiveness of MNTK activities under the new economic management conditions. It would be elementary, one would think, to give the MNTK a systematized list of party and state resolutions, removing the abyss of all kinds of different

restrictions. The benefit from this would be considerable. Not so long ago, they tried to keep the rights up on the shelf, and put only the responsibilities on the table.

Today we are working out a method, which includes working through the idea of access to a market through science-intensive production, supplying experimental models, studying demand and involving of Western partners in meeting it. It is predominantly a question of production created on the basis of domestic scientific research and experimental design work.

Vladimir Viktorovich, I have worked with enterprises which have managed to go out and work successfully in the world market, without marks in their pockets, but these are indeed rare exceptions. In the overwhelming majority of cases, some amount of hard currency capital is needed in order to start. Meanwhile, attending meetings in ministries and departments, I have repeatedly heard that the problem with hard currency in the country is fairly difficult.

I agree that there is no particular abundance of it. The question is how and on what to spend that which we do have. For instance, quite recently, Minneftegaz representatives appealed to us: give us several million to develop a promising well. They claim that it will provide more than those which are working now. Several years ago such a request might have evoked dismay, but, of course, could have been met. Today, other approaches are needed. One takes funds from inefficient projects and wastes no time in shifting one's concerns onto the shoulders of the state. Thus it is with the MNTK: there is the possibility of possessing credit and earning funds. We think that inter-sectorial complexes, which have are serious scientific and production resources at their disposal, should learn to live and work on the basis of hard currency self-support.

**How are you thinking of solving the problem with cadres, which in reality do or do not decide everything?**

In this regard, there are several ideas and approaches. First, the Chamber of Commerce, Litsenziorg and Litsenziinka are restructuring their activities and will offer the necessary services to MNTKs on a commercial basis. An agreement has also been reached in principle to the effect that some of their commercial cadres will be transferred to the complexes. The complexes are prepared to employ the services of specialists, hiring them as consultants, commercial directors and so on... After all, it is not a question of job titles.

In the course of time, it can be no other way: the complexes are raising their own cadres and setting up commercial ties as well.

Secondly, we should also not overlook the fact that even now we have a number of companies with mixed capital. For example, Tekhnounion in the FRG and Tekhnikon in Italy, which have solid experience in work on the

world market, can represent the interests of the MNTK abroad. I am certain that in time companies of this and other types will number in the tens and hundreds.

Vladimir Viktorovich, one last question: an enormous number of inventions are registered in our country annually, yet we have few patents and licenses. Production worthy of the world market is also sparse. Can all of this be reduced to our specialists' lack of effort in the area of foreign trade?

It is hard to give a simple answer. Consider, for instance, inventions. Yes, there are many. However, quantity is not important. Based on eliminating problems with obsolete equipment, they can sometimes even lead us away from the main trends of scientific and technical progress. Add to this the sluggish production mechanism, which has been oriented towards producing traditional output within the limits of its capabilities, and thus towards innovations which lead away, and the picture of stagnation is almost complete.

What does it mean to patent a technical solution? It is not much different from buying a place for trade purposes. However, once we slowly make havoc of the manufacture of new products, this place stands empty. Counting the money earned from the sale of licenses is also not the point. By selling a license, one surrenders the "playing" field for almost nothing.

Today we need something else: serious ideas and solutions in the key areas of scientific and technical progress, energetic development of the production of science-intensive output, and cooperation in efforts at the international level. We should also give up the view of our economy as ours alone. It is part of the world economic whole and cannot develop in isolation. The our department's efforts are aimed at helping the MNTK create experimental production, providing them with the possibility of working under the conditions of greatest favor, instead of prohibitions.

Foreign-trade organizations, which are creating a bank for modern technologies, are also working in the same direction.

**Conference Meets on Cost Accounting for S&T Organizations**

18140040 Moscow *PLANOVYE KHOZYAYSTVO*  
in Russian No 8, Aug 88 pp 122-124

[Article by Candidate of Economic Sciences A. Solovyev under the rubric "Scientific Life": "The Problems of Cost Accounting at Scientific Organizations"]

[Text] The 3d All-Union Applied Science Conference, which was devoted to the activity of scientific research institutes under the conditions of full cost accounting and self-financing, was held in April 1988. Leading specialists in the field of the management, organization, and economics of science, scientology scholars, executives of scientific research institutes, scientific production associations, production associations, and interbranch scientific technical complexes, responsible officials of party, soviet, and planning organs, and representatives of the scientific and technical community participated in it.

Opening the conference, V.A. Mikhaylov, deputy chairman of the State Committee for Science and Technology, noted that more than 1,200 scientific organizations of 37 industrial ministries and departments had changed over to the new conditions of management. The changeover of science to full cost accounting envisages profound changes both in the methods and content of the work of scientific research institutes and design bureaus and in the organization and management of scientific and technical activity. The introduction of the new economic mechanism was carried out on the basis of the formation of commodity-money relations in all the units of management of science, the use of contract prices for the scientific and technical product and services, and the special-purpose financing of research and development with the expansion of the competitive distribution of assignments and resources.

The speakers emphasized that the implementation of the innovations, which have been incorporated in the conditions of management, requires the thorough and comprehensive analysis and the prompt evaluation of the results of cost accounting for the purpose of taking the necessary steps to ensure the improvement of the methodology of reforms being implemented. Thus, A.I. Kazakov, deputy chief of a department of the State Committee for Science and Technology, directed attention to the fact that it is now already possible to note significant positive changes in the acceleration of the development and introduction of new equipment and in the increase of the efficiency of the use of the scientific and technical potential and the improvement of the results of scientific and technical activity. However, the deep-seated possibilities of scientific organizations under the conditions of full cost accounting will appear later, inasmuch as the reform in science is oriented toward the commitment to use of factors of a long-term nature. At the same time along

with the appreciable activation of the creativity of scientific collectives and the identification of enormous reserves of initiative there are individual negative features of cost accounting, which are connected first of all with the specific nature of scientific and technical activity and the lack of preparation of ministries and departments for the supervision of scientific organizations under the new conditions.

The task of today is to promptly identify negative processes and to eliminate them in good time. While speaking about the specific problems and results of cost accounting in science, Corresponding Member of the USSR Academy of Sciences V.V. Klyuyev noted that the basic volume indicators of scientific research institutes and design bureaus have improved substantially (the amounts of work have increased, the wage of personnel has been increased with an overall reduction of the staff, the qualitative parameters of research and development have improved). At the same time S.I. Cherkasov, deputy chief of an administration of the USSR Ministry of Construction in the Urals and West Siberia Regions of the USSR, believes that far from all the economic organizational problems are being successfully solved by cost accounting means. Thus, cost accounting did not touch upon such a basic question of the acceleration of scientific and technical progress as the integration of sectorial science with academic, VUZ, and plant science. The fate of the head scientific organizations for the sector and for problems, which have performed basic research in the most important priority directions, is arousing serious apprehensions when changing over to cost accounting.

The speakers noted the lack of preparation of the methodological base of the reform in science. A significant portion of the reports were devoted to the improvement of the management of scientific and technical progress under the new conditions. Here the advisability of developing an integral concept of the management of the unified scientific and technical policy in the country was emphasized. V.L. Makarov, director of the Central Institute of Economics and Mathematics of the USSR Academy of Sciences, directed attention to the necessity of forming a new scientific direction—the economics of intellectual products, with which first of all the scientific and technical product is grouped. It is not enough to declare the results of the activity of scientific organizations a commodity, it is necessary to provide it with commodity attributes and to link it with real economic processes. Otherwise the commodity relations in the sphere of science, as before, will remain conditional and isolated from the commodity relations in physical production.

Here the information on the intellectual product, the elimination of the shortage of resources for the development of science, the creation of preferential economic conditions for the use of new equipment in production, real economic competition, and variance in the solution of scientific and technical problems are called upon to

play a key role. It is important to eliminate both the monopoly of developers and the dictation of producers on the use of innovations. The latter circumstance is especially urgent under present conditions, when the economic well-being of the scientific organization in practice depends entirely on the users of the scientific and technical product. In this connection S.B. Perminov, director of the All-Union Scientific Research Institute of Economic Problems of the Development of Science and Technology, substantiated the necessity of interconnecting all organizational and economic measures into a unified scientific and technical policy, which would include both the establishment of the priority directions of scientific and technical progress and the specification of the demands on the economic mechanism which ensures technological changes.

At the conference it was noted that the pursuit of immediate economic results under the new conditions is relegating to the background the formation of a basic reserve and the solution of important scientific problems, and this is undermining the long-range strategy of scientific and technical progress. The increase of the production need in the area of major scientific and technical achievements by means of a preferential economic mechanism is necessary.

Academician A.G. Aganbegyan focused attention on the change of structural policy in the area of the management of scientific and technical progress, having made such scientific production associations, which are the optimum nucleus for the integration of science with production, the key figure in the present structure of the economic mechanism. However, it is expedient to shift from the stage of sectorial scientific production associations to intersectorial (state) associations, which make it possible to settle the set of questions which are connected with the development, introduction, and use of new equipment.

During the discussion it was emphasized that the restructuring of the economic mechanism in the sphere of science is not an end in itself. At the same time cost accounting in sectorial science is mainly of a formal nature, without making qualitative changes in the results of the activity of scientific organizations. Thus, in particular, in the opinion of Yu.V. Yakovets, head of a chair of the Academy of the National Economy attached to the USSR Council of Ministers, in the majority of sectors of industry the technical level of production and the quality of items continues to decrease. Machine building products are being updated especially slowly.

One of the causes of the low scientific and technical level of the output being produced, and especially of research and development on new equipment, is the low activity of inventors and the decrease of the share of introduced inventions in the development being performed. As I.S. Nayashkov, chairman of the USSR State Committee for Inventions and Discoveries, noted, the growth rate of the indicators in the area of invention slowed so much

during the 1980's that in a number of cases they acquired a negative dynamics. Thus, only about 2,000 production prototypes (in 1987, 2,500) and 3,500 trademarks (in 1987, 3,700) were registered, which comes respectively to about 1 and 0.6 percent of their world magnitude.

As a consequence of the low activity of inventors a decrease of the scientific and technical level of completed and introduced research and development and devised models of new equipment began. For example, the share of completed developments in industrial ministries, which surpassed the best world models, decreased from 9.1 percent in 1980 to 5.9 percent in 1986 and 5 percent in 1987. The share of developments on new equipment with the use of inventions comes to less than a third. The share of models of new equipment, which surpassed the level of the best world models, decreased from 18 percent in 1980 to 14 percent in 1986.

The improvement of statistical reporting in the area of scientific and technical progress, in the opinion of I.A. Pogosov, deputy chairman of the USSR State Committee for Statistics, is a most important condition of the successful transformation of the sphere of science. The problems of the statistical study of scientific organizations and the state and the efficiency of the use of their potential and the comprehensive consideration of the introduction of scientific and technical achievements under the conditions of cost accounting are becoming very urgent. The basic principle here is the transition from the planning of a large number of indicators to integral indicators, which evaluate the scientific and technical level of sectors and the national economy as a whole. As before, the development of advanced methods of calculating and measuring the influence of the results of the development of science and technology on the final indicators of social production holds a central place in statistical reporting.

At the section meetings the basic attention was focused on practical questions of cost accounting at scientific organizations. In the decision of the conference it was noted that the changeover of scientific research institutes to the new conditions has become an important element of the improvement of the entire economic mechanism. However, the restructuring of science has obstacles, for the surmounting of which it is necessary to develop the methods and practice of the economic analysis of cost accounting activity. It was recommended to the State Committee for Science and Technology to improve significantly the work on the procedural and organizational support of such an analysis, to expand the network of consultation centers on the changeover of science to full cost accounting, and to create the conditions for the improvement of the methods and practice of cost accounting at scientific research institutes and design bureaus.

The conference participants considered it expedient to hold annually all-union forums of scientologists of the country, having noted here that their decisions are still

not being completely fulfilled and that the State Committee for Science and Technology is not ensuring the necessary monitoring of their implementation. The discussions of scientological problems are called upon to make up for the lack of large-scale intersectorial studies

of the methodological problems of the management of scientific and technical activity, the need for which became urgent long ago.

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**AzSSR Awards Committee Hands Out S&T Awards**

*18140302b AzSSR BAKINSKIY RABOCHIY  
in Russian 29 Apr 88 p 3*

[Article: "On the Highway of Scientific and Technical Progress"]

[Text] Soviet scientists are called upon to be active participants in restructuring, the life-giving wind which renews our society. In many ways, the success of the changes depends on scientific leaders, their creative work, and aspirations to more effectively apply research results in practice. The awarding of republic state prizes to a group of scientists on the eve of the 68th anniversary of the victory of Soviet power in Azerbaijan attests to the fruitfulness of scientific exploration, which accelerates scientific and technical progress.

In discussing this with an Azerinform correspondent, E.Yu. Salayev, chairman, AzSSR Committee on State Prizes in Science and Technology, full member of the republic Academy of Sciences, noted that weighty and significant works by scientists, who have made a considerable contribution to the republic's economic and spiritual life, received this high award.

In our day, when interest in the history of the country and republic has grown immeasurably in society, especially among youth, it is hard to overestimate the topicality of studies by social scientists. Unquestionably, the state prize-winning series of works devoted to the activity of the Baku Commune and its commissars draws the attention of specialists, students, and all who cherish the names of those who gave their lives to the joyous work of the revolution. The author, P.A. Azizbekov, AzSSR Academy of Sciences academician, doctor of historical sciences, has devoted many years and much creative effort to studying the brief but brilliant lives of 26 Baku commissars and the history of the socialist revolution and building socialism in Azerbaijan. His book convincingly and fully illuminates the images of legendary heroes—true Leninists, soldiers of the revolution and the party, heralds of the ideas of the friendship and brotherhood of peoples. Written in a lively, emotional style, these works are distinguished by strict documentation and high scientific level. They actively contribute to the ideological tempering of the working people and their upbringing in the spirit of Soviet patriotism and internationalism.

A prize was awarded to a group of scientists at Azerbaijan State University imeni S.M. Kirov and the AzSSR Academy of Sciences Institute of Physics—A.Kh. Zeynally, A.M. Mamedov, Sh.M. Efendiiev, K.R. Allakhverdiyev, G.L. Belenkiy, R.A. Suleymanov, and B.G. Tagiyev—for the series of works "*Spektroskopiya Elektronnykh i Kolebatelnykh Sostoyaniy Khalkogenidnykh i Oksidnykh Poluprovodnikov. Vliyanie Elektricheskikh i Deformatsionnykh Poley*" [Spectroscopy of Electronic and Oscillating States of Chalcogen and

Oxide Semiconductors. Influence of Electrical and Deformation Fields], published in 1970-1986. These important scientific studies were united for the purpose of establishing the specific features of the oscillating and electronic spectra of crystals, to which a chemical connection differs considerably in different directions. The solution to the problem which was raised has made it possible to put together the full picture of the electronic and oscillating states of a broad range of conductors and to develop a number of instruments. The complexity of the objects which were studied and the topicality of the problems raised the need for experimental studies under extreme conditions and for using optical, neutron and synchrotron radiation spectroscopic methods. The results of basic research by Azerbaijan scientists have found reflection in more than 100 articles in republic, all-Union and international journals. About 20 author's certificates have been defended.

A.I. Aliyev, Z.A. Buniatzade, F.G. Dadashev, Sh.F. Mekhtiyev and S.G. Salayev were awarded prizes for the work "*Karta Mestorozhdeniy Nefti i Gaza i Perspektivnykh Struktur Azerbaydzhanskoy SSR*" [Map of Oil and Gas Deposits and Promising Structures in the Azerbaijan SSR]. The map, published by the USSR Council of Ministers Main Administration for Geodesy and Cartography, is the result of many years of scientific research on the summary and analysis of geological and geophysical documents and data from deep and super-deep drilling. This work reflects all of the greatest achievements in the study of specific features of the geological structure and oil- and gas-bearing territory of Azerbaijan and of the adjoining area of water in the Caspian Sea. The purpose of this study, relevant to practical geology, is to provide scientific grounds for raising the efficiency of exploratory oil and gas drilling work, to ensure a raw material base for the further development of the republic's petroleum and gas industry.

Professor I.T. Abasov presented various aspects of clinical gastroenterology in his series of works on the diagnosis, treatment and prevention of diseases of the digestive tract. The medical scientist's studies were based on many years of clinical practice and are the result of work with patients with stomach diseases. His monographs, articles and other publications illuminate certain inadequately studied problems in diagnostics and give recommendations for the extensive use of a number of new examination methods in the clinic. They are being quoted in many foreign manuals and monographs. These works have earned broad recognition not only from practical doctors, but also from scientists working in different areas of medicine.

A prize was awarded for the creation and introduction of a new metal-saving technology and equipment for manufacturing the plates for the magnetic circuits of electric motors to F.S. Aga-zade, A.M. Akopov, N.S. Muradov, A.Yu. Karakhanov, E.I. Aliverdiyev, F.N. Ismaylov, Z.V. Kadimaliyev and N.N. Guseynov. The technology

which they proposed makes it possible to increase the nesting coefficient for steel blanks and to reduce metal losses. It has been introduced at the Baku Electric Machine Building Plant of the "Azerelektromash" Production Association, as well as in a number of enterprises in the RSFSR and the Ukrainian, Estonian and Lithuanian SSRs and has provided a significant profit and economy of materials.

Leading production workers, the right flanks of socialist competition, who ensure the success of restructuring at their places of work, were marked by republic state prizes. A high award was given for great achievements in labor and personal contribution to finding and utilizing internal production reserves to K.A. Arazov, electric locomotive engineer; B.S. Ibragimov, adjusters' brigade leader; Sh.S. Kazikhanov, metal-workers' and fitters' brigade leader; B.Ya. Klimenko, electric welder; A.G. Osipov, joiners' brigade leader; G.G. Ramazanov, lathe operator; and A.V. Farmanov, asphalt-laying machine operator.

Prizes were awarded for great achievements in labor and personal contribution to saving on raw materials and materials, improving the quality of products being produced and the efficient utilization of equipment to O.A. Bagirov, milling-machine operator; L.V. Barusheva, seamstress; A.D. Veliyev, petroleum workers' brigade leader; G.K. Kasimov, airplane commander; R.D. Mamedov, fitters' and riggers' brigade leader; S.G. Mamedov, master driller; D.F. Farzaliyev, pipe-line workers' brigade leader.

Prizes were awarded for great success in labor, creative initiative and activeness, and for obtaining high and steady yields of agricultural and animal husbandry products to A.P. Abbasov, sheep-herding brigade leader; T.A. Abbasov, grain-farming brigade leader; A.B. Aliyev, vegetable farming brigade leader; R.A. Bakhyshova, cotton-grower; T.S. Galstyan, viticulturalist; T.I. Damirov, cotton-growing brigade leader; and M.M. Medzhidova, milkmaid.

Congratulating the winners with all our hearts, we wish them new successes in the name of the flourishing of the Soviet Homeland, the further uplifting of science and technology and the effective development of the republic's economy.

**UkSSR Supreme Soviet Awards for Geology**  
*18140302a Kiev RABOCHAYA GAZETA in Russian*  
*3 Apr 88 p 1*

[UkSSR Supreme Soviet Presidium ukases conferring awards in geology, signed by V. Shevchenko, UKSSR Supreme Soviet Presidium chairman, and N. Kholomenko, UkSSR Supreme Soviet Presidium secretary, in Kiev, 1 April 1988. Passages in boldface as published]

[Text]

**On Conferring the UkSSR Supreme Soviet Presidium Honorary Awards and Awards to Workers in Geology**

For successfully raising the efficiency of geological prospecting work, actively introducing progressive work methods and for high production indicators, the following have been awarded:

**The UkSSR Supreme Soviet Presidium Honorary Award** Petr Nikolayevich Gerasimenko—master driller, Zhitomir Geological Prospecting Expedition, "Sevukrgeologiya" Geological Production Association.

**Bogdan Ivanovich Knysb**—chief, Velikomostovskaya Geological Prospecting Group, Lvov Geological Prospecting Expedition.

**Yuriy Sergeyevich Petryuk**—drill-operator, Pervomayskaya Petroleum and Gas Prospecting Deep Drilling Expedition, Kharkov Oblast.

**Ivan Yakovlevich Yashchenko**—motor mechanic, Nezhinskaya Petroleum and Gas Prospecting Deep Drilling Expedition, "Chernigovneftegazgeologiya" Geological Production Association.

**The UkSSR Supreme Soviet Presidium Award**

**Yuriy Georgiyevich Bakin**—senior scientific associate, Institute of Mineral Resources, USSR Ministry of Geology, Simferopol.

**Vasiliy Petrovich Vasilishin**—drilling rig mechanic, Kalushskaya Petroleum and Gas Prospecting Deep Drilling Expedition, Ivano-Frankovsk Oblast.

**Georgiy Ivanovich Klyuchko**—master driller, Priazovskaya Geological Prospecting Expedition, Donetsk Oblast.

**Anatoliy Nikitovich Kokhan**—master driller, Krymskaya Hydrogeological Expedition.

**Vasiliy Afanasyevich Leshchenko**—head geologist, Thematic Expedition Group, "Poltavneftegazgeologiya" Geological Production Association.

**Mikhail Petrovich Nimchenko**—drill operator, Piriatinskaya Oil and Gas Prospecting Deep Drilling Expedition, Poltava Oblast.

**Ivan Mikhaylovich Palitsu**—blasting crew member, West Ukraine Geophysical Prospecting Expedition, Lvov Oblast.

**Viktor Grigoryevich Stepanchenko**—master driller, Strobel'skaya Geological Prospecting Expedition, "Voroshilovgradgeologiya" Geological Production Association.

**Petr Andreyevich Turchin**—hoist operator, Akhtyrskaya Group, Poltava Expedition for Geophysical Research in Wells.

**On Conferring the Honorary Title of Honored Geologist of the UkrSSR to Workers in Geology**

For services in developing the mineral and raw material base, personal contribution to the acceleration of exploration and the mastery of new deposits of useful minerals, the honorary title of Honored Geologist of the UkrSSR is conferred upon:

**Vitaliy Ivanovich Grigorov**—master driller, Torezskaya Geological Prospecting Expedition, "Donbassgeologiya" Geological Production Association.

**Vitaliy Pavlovich Nizhenets**—master driller, Mirgorodskaya Oil and Gas Prospecting Deep Drilling Expedition, "Poitavneftegazgeologiya" Geological Production Association.

**Lithuanian State Prizes for 1988 Announced**  
*18140017 Vilnius SOVETSKAYA LITVA in Russian*  
21 Jul 88 pp 1, 2

[Article under the rubric "In the Central Committee of the Communist Party of Lithuania and the Lithuanian SSR Council of Ministers: On the Awarding of the 1988 Lithuanian SSR State Prizes in Science, Technology, Literature, Art, and Architecture"]

[Text] The Central Committee of the Communist Party of Lithuania and the Lithuanian SSR Council of Ministers, having considered the representations of the Committee for Lithuanian SSR State Prizes in Science and Technology and the Committee for Lithuanian SSR State Prizes in Literature, Art, and Architecture, resolved to award the 1988 Lithuanian SSR State Prizes to:

**In Science and Technology**

Doctor of Physical Mathematical Sciences A. Krotkus, head of the Sector of Narrow Slot Semiconductors of the Institute of Semiconductor Physics of the Lithuanian SSR Academy of Sciences; Doctor of Physical Mathematical Sciences A. Laurinavichyus, head of the Sector of Microwave Magnetoplasma Phenomena of this institute—for the series of works "Studies of Narrow Slot Semiconductors by Means of Microwave Helicon Waves and Ultrashort Electric Pulses" (1970-1987).

Doctor of Technical Sciences Professor G. Pranyavichyus, head of the Chair of Control Systems of the Automation Faculty of Kaunas Polytechnical Institute imeni Antanas Snieckus; Doctor of Technical Sciences

Professor Yu.-K. Stanishkis, head of the Chair of Production Automation of the same faculty of this institute—for the series of works "The Modeling and Control of Complex Technological Systems (Theory and Application)" (1971-1987).

A. Baradokas, senior scientific associate of the Division of Gauge Centers of the Vilnius Affiliate of the Experimental Scientific Research Institute of Metal Cutting Machines Tools; Z. Bekintis, head of a laboratory of the same division of this affiliate; Candidate of Technical Sciences A. Kasparaytis, head of the same division of this affiliate; V.-S. Krishchyunas, head of the Division of Technological Research of this affiliate; Yu.-S. Kumetaytis, senior scientific associate of the Division of Gauge Centers of this affiliate; V.-Yu. Mudenas, senior foreman of an experimental section of the Pretsizika Pilot Plant of this affiliate; Candidate of Technical Sciences V.-Z. Ramanauskas, head of a laboratory of the Division of Gauge Centers of this affiliate; Candidate of Technical Sciences R.-Yu. Tonkunas, head of a laboratory of the same division of this affiliate; A.-M. Shukis, head of a laboratory of the same division of this affiliate—for scientific research and experimental design work on the development of gauge centers (1976-1987).

Doctor of Medical Sciences K. Vitkus, leading scientific associate of the problem laboratory of microsurgery of the Faculty for the Advanced Training of Physicians of Vilnius State University imeni V. Kapsukas; Candidate of Medical Sciences M. Vitkus, director of the Vilnius Republic Center of Microsurgery of the clinic attached to the Scientific Research Institute of Experimental and Clinical Medicine; V. Klimas, junior scientific associate of the problem laboratory of microsurgery of the Faculty for the Advanced Training of Physicians of Vilnius State University imeni V. Kapsukas; M. Minderis, junior scientific associate of the same laboratory of the Faculty for the Advanced Training of Physicians of this university; Candidate of Medical Sciences T. Norkus, docent of the 1st Surgical Chair of the Kaunas Medical Institute; Candidate of Medical Sciences Yu. Olekas, scientific associate of the problem laboratory of microsurgery of the Faculty for the Advanced Training of Physicians of Vilnius State University imeni V. Kapsukas; G. Raube, physician of the Department of Reconstructive Microsurgery of the clinic attached to the Scientific Research Institute of Experimental and Clinical Medicine; V. Tutkus, physician of the same department of the clinic attached to this institute; Candidate of Medical Sciences S. Shpokyavichyus, junior scientific associate of the problem laboratory of microsurgery of the Faculty for the Advanced Training of Physicians of Vilnius State University imeni V. Kapsukas—for a series of works on reconstructive microsurgery (1982-1987).

Candidate of Agricultural Sciences Ya. Adomavichyute, an operator of the Republic Agricultural Computer Center; V. Vazalinskas, deputy director of this center; Candidate of Agricultural Sciences V. Vasiliyauskene, deputy director for scientific work of the Vokeskiy Affiliate of

the Lithuanian Scientific Research Institute of Agriculture; Candidate of Agricultural Sciences K. Matusyavichus, director of the Republic Planning and Surveying Station of the Chemicalization of Agriculture; Candidate of Agricultural Sciences V. Mashauskas, head of the Division of Agrochemistry of the Lithuanian Scientific Research Institute of Agriculture; Candidate of Agricultural Sciences A. Onaytis, deputy director for scientific work of this institute; Corresponding Member of the Lithuanian SSR Academy of Sciences, Doctor of Biological Sciences G. Paulyukavichus, head of a laboratory of the Division of Geography of the Institute of Zoology and Parasitology of the Lithuanian SSR Academy of Sciences; Candidate of Agricultural Sciences A.-K. Plesyavichene, senior scientific associate of the sector of agrochemistry of the Vezhayskiy Affiliate of the Lithuanian Scientific Research Institute of Agriculture; Candidate of Agricultural Sciences A. Shvyadas, head of the sector of agrochemical service of the Division of Agrochemistry of this institute—for the series of works "The Scientific Bases of an Agronomically Efficient and Ecologically Safe System of the Fertilization of Field Crops" (1960-1987).

Doctor of Biological Sciences L. Grinyus, professor of the Chair of Biochemistry and Biophysics of Vilnius State University imeni V. Kapsukas—for the monograph "Transport makromolekul u bakteriy" [The Transport of Macromolecules in Bacteria] (Moscow, "Nauka", 1986).

Candidate of Veterinary Sciences V. Sharkunas, docent of the Chair of Contagious Diseases of the Lithuanian Veterinary Academy—for the textbook "Veterinary Parasitology" (Vilnius, "Mokslas", 1983).

Doctor of Philological Sciences A. Zalatoryus, leading scientific associate of the Division of Pre-Soviet Lithuanian Literature of the Institute of the Lithuanian Language and Literature of the Lithuanian SSR Academy of Sciences—for the monographs: "The Development and Poetics of the Lithuanian Narrative" (Vilnius, "Vaga", 1971) and "The Lithuanian Short Story of the 20th Century" (Vilnius, "Vaga", 1980).

Doctor of Historical Sciences R. Zhepkayte, leading scientific associate of the Division of the History of Capitalism of the Institute of History of the Lithuanian SSR Academy of Sciences—for the monographs: "Lithuania in the Labyrinth of International Politics (1918-1922)" (Vilnius, "Mintis", 1973), "Diplomacy in the Service of Imperialism: The Relations of Lithuania and Poland During 1919-1939" (Vilnius, "Mokslas", 1980), and "Lithuania and the Great States During 1918-1939" (Kaunas, "Shvesa", 1986).

Y.-A. Bartkyavichus, chief engineer; A. Valyukavichene, press operator; V. Zhidkov, plasterer; S. Linkovich, general director; K. Nausedas, chairman of the

trade union committee; I. Khont, deputy general director; E. Yankovskiy, fitter and brigade leader; G. Yansyavichus, painter—for outstanding successes in labor and socialist competition and the solution of the problems of the standards of production and social development at the Vilnius Production Association of Silicate Items.

S. Banis, adjuster and operator of the bagging of powdered sugar of the Pavenchayskiy Sugar Combine; A. Zaytsev, docker and machine operator of the Klaipeda Commercial Seaport imeni 60-letiya SSSR; A. Zubritskas, assistant foreman of the Alitus Cotton Combine imeni 60-letiya Kompartii Litvy; B. Lautsys, woodworker and carpenter of the Kupishkskiy Rayon Construction Organization; A. Marazas, tractor driver and machine operator of the Krakes Kolkhoz of Kedainiskiy Rayon; A. Meleshute, confectioner of the Geluva Association of the Shyaulyay Trust of Dining Rooms, Restaurants, and Cafes; Ch. Petkevich, instrument control man of the granulation of mixed fodders of the Shvenchenelyay Combine of Grain Products; A. Yuozunatene, operator of the mechanized milking of cows of the Primin Kolkhoz of Shyaulyayskiy Rayon; Yu.-R. Yuochas, chief agronomist of the Kyapalyay Kolkhoz of Ionishkskiy Rayon—for outstanding successes in labor and socialist competition.

#### In Literature, Art, and Architecture

Ya. Kanovich (his literary pseudonym is Grigoriy Kanovich), writer, honored figure of culture of the Lithuanian SSR—for the novels (a set of two): "The Tears and Prayers of Fools" (Vilnius, "Vaga", 1983) and "And There Is No Paradise for Slaves" (Vilnius, "Vaga", 1985).

V. Kisarauskas, painter, honored figure of the arts of the Lithuanian SSR—for the paintings: "The Holiday" (1975), "Red Requiem. Dedicated to M.-K. Chyurlenis" (1975), "V. Mikolaitis-Putinas and Adam Mickiewicz" (1977), "Portrait of the Painter Y. Rustemas" (1979), "Theatrical Motif" (1980), from the cycle "The 20th Century" III (1987).

Y.-O. Balakauskas, composer, honored figure of the arts of the Lithuanian SSR—for Symphony No 2 (1979), Concerto for Oboe and Strings (1981), "Instrumental Opera" for symphony orchestra (1987).

P. Mataytis, honored figure of the arts of the Lithuanian SSR—for the development of the traditions of Lithuanian folk art, the reconstruction of authentic Lithuanian songs, artistic musical and theatrical programs and stagings at the Lithuanian Folklore Theater: "My Gold-Stringed Kankles" (1985), "Beyond the Icy Dew Around the Field of Rye" (1987), "Sutartines, Folklore of the Late 19th and Early 20th Centuries" (1974-1987).

I. Milkyavichyte, people's actress of the Lithuanian SSR—for creative activity during 1986-1987.

A. Kibrantsas, honored architect of the Lithuanian SSR; S.-B. Lasavitskas, architect; A. Lisanke, archeologist; E. Purlis, honored architect of the Lithuanian SSR (supervisor of the work)—for the study, restoration, and adaptation for the Lithuanian SSR Museum of Applied Art of the former arsenal of the Vilnius Lower Castle.

**Institute Studies Effect of S&T Progress on Economy, Society**  
*18140013 Moscow OBRASHCHESTVENNYYE NAUKI in Russian No 4, Jul-Aug 88 pp 184-189*

[Article by Candidate of Economic Sciences Yu. Golovnin, scientific secretary of the Institute of Economics and Forecasting of Scientific and Technical Progress of the USSR Academy of Sciences: "The Institute of Economics and Forecasting of Scientific and Technical Progress of the USSR Academy of Sciences." Passages in italics as published]

(Text) A new research center—the Institute of Economics and Forecasting of Scientific and Technical Progress (IEP NTP)—was established 3 years ago in the system of institutions which are united by the Social Sciences Section of the Presidium of the USSR Academy of Sciences. The task of the comprehensive elaboration of the problems and prospects of the socioeconomic development of the USSR, which are connected first of all with scientific and technical progress, was posed for its collective.

There is no need to explain the reasons for the appearance of the institution, which is specially oriented toward the comprehensive study of the problems of the socioeconomic, scientific, and technical forecasting of the prospects of the development of the country under the influence of scientific and technical progress. Scientific and technical progress should play a key role in the implementation of the strategy of the acceleration of the socioeconomic development of the USSR, which has been adopted by the CPSU.

In the directive documents on the institute the basic directions of its scientific activity are specified in the following manner:

—the problems and prospects of the socioeconomic development of the USSR on the basis of the acceleration of scientific and technical progress; the forecasting of the growth rate and structure of the economy; the problems and prospects of the development of the basic interbranch complexes; the forecasting of the increase of the well-being of the people and the social aspects of scientific and technical progress;

—the economic problems and prospects of the development of science, engineering, and technology; the questions of the improvement of the management and organization of scientific and technical progress;

—the theoretical, methodological, and procedural aspects of scientific, technical, and socioeconomic forecasting, including the development of methods and models of the compiling of national economic forecasts, their information support, and the formation and management of automated databases and the automation of analytical and forecasting calculations.

The scientific organizational support of the formulation of the Comprehensive Program of Scientific and Technical Progress of the USSR for 20 Years, which is updated every 5 years, has also been assigned to the institute.

The research activity of the Institute of Economics and Forecasting of Scientific and Technical Progress actually began in February 1986, when a group of associates of the Central Institute of Economics and Mathematics (TsEMI) of the USSR Academy of Sciences, who for a number of years dealt with problems of national economic forecasting and the economics of scientific and technical progress, transferred to it. Another group of associates, who specialize in the study of the socioeconomic aspects of scientific and technical progress, joined the ranks of the institute in April 1986 from the All-Union Scientific Research Institute of Systems Research.

Academician A. Anchishkin, a prominent Soviet economist and the author of basic works on the theory of socialist reproduction and on the macromodeling and forecasting of the development of the USSR national economy, was the initiator of the establishment of the institute and its first director. Aleksandr Ivanovich died suddenly on 24 June 1987 at the age of 53.

In February 1988 at the General Assembly of the Economics Department of the USSR Academy of Sciences Corresponding Member of the USSR Academy of Sciences Yu. Yaremenko, a prominent specialist in the theory and methodology of national economic forecasting and in questions of structural changes in the economy under the influence of scientific and technical progress, was elected director of the Institute of Economics and Forecasting of Scientific and Technical Progress.

In its personnel composition the institute is multidisciplinary. The bulk of its scientific associates (in all there are more than 250 of them) are economists. Scientologists, sociologists, demographers, mathematicians, and others also work at the institute. The basic structural unit at the institute is the laboratory. Research programs (projects) are implemented jointly by several laboratories, which ensures a comprehensive approach to the phenomena and processes that are being studied.

During the current five-year plan the efforts of the collective of the institute are being concentrated in the following research directions, which have been deemed priority directions: the growth rate, efficiency, and structure of social production; the social aspects of scientific and technical progress and the well-being of the people; the technical modernization of the national economy and the development of technologies; the economics and prospects of the development of science; the prospects of USSR foreign economic relations; the methodology of long-term forecasting and the elaboration of a concept of the development of the national economy; the development of an automated system of forecasting.

Let us briefly describe the listed directions. The study of the growth rate, efficiency, and structure of social production has as a goal first of all the formulation of a forecast of the national economic dynamics and structure of production and the determination of the conditions and factors of socioeconomic development. The social factors of economic development are being analyzed, the volumes, structure, and efficiency of the use of manpower resources are being forecast, the trends of population development are being established, and the directions and steps of long-range demographic policy are being substantiated. Special attention is being devoted to the formation of consumer resources and to the nonproduction sphere.

Within the indicated direction such questions as the reproduction of fixed capital, a capital-saving investment policy, the sectorial breakdown of capital investments, the financial and value structure of the economy, and the development of the basic national economic complexes are also being studied intensively.

The studies of the social problems of scientific and technical progress and the questions of the forecasting of the well-being of the people are aimed at the formulation of the prospects of the development of the sphere of consumption on the basis of the achievement of a balance of the income of the population with the supply of goods and services, the formation of a new set of consumer standards, the improvement of the socialist forms of the organization of consumption, and the increase of its standards.

The basic directions of the development of the sectors of the sociocultural and the housing complexes, the modernization of their material and technical base and the strengthening of the personnel potential, and the improvement of the economic organizational mechanism of their functioning are being determined. The analysis of the social aspects of regional development and the formation of promising systems of settlement, including the regulation of interrayon differences in living conditions and the strengthening of the social functions of territorial management, has been singled out as a separate theme. Great importance is being attached to the substantiation of socioeconomic changes in the sphere of labor and to the study of the socioeconomic mechanism of efficient full employment.

The study of the economic problems of the technical modernization of the national economy of the country should provide material for the formulation of the concept of this modernization. The specific nature of technical progress in different sectors and complexes, investment policy, and the questions of the updating of fixed capital and production capacities and the products of machine building and the increase of the quality of these products should be studied. It will be necessary to establish the general demands of scientific and technical

progress on the economic mechanism and social policy. Finally, the formulation of a forecast of the comprehensive automation and electronization of the national economy is envisaged.

The program of studies, which are acquiring greater and greater importance—the economic problems and prospects of the development of science—encompasses a quite wide range of themes, including:

- the organization and functioning of the scientific complex of the country and the complexes of regions, ministries, and departments in the system of sectors of the national economy;
- the choice of promising directions of scientific research and experimental design work;
- the dynamics of the structure of research and development;
- the forecasting of the basic types of resources of science (by stages of scientific research and experimental design work, by sectors and fields of science and the national economy, by directions of scientific research work);
- the reproduction of the resources of science;
- the improvement of the mechanism of the planning, financing, and management of scientific research and experimental design work;
- the generalization of the experience of the establishment and functioning of advanced organizational forms of scientific research and development (interbranch scientific technical complexes, scientific production associations, scientific research institutes) under the conditions of economic reform;
- the information technology of the substantiation, formulation, and management of scientific and technical projects and programs;
- the methods of intercountry comparisons of the scientific potential.

The analysis of the long-range prospects of the development of USSR foreign economic relations has been started. This analysis should promote the determination of the priorities in the development of USSR imports and exports for the purpose of increasing the positive effect of foreign economic and scientific and technical relations on the efficiency of social production and on the improvement of the specialization of the country in the system of the world division of labor and in international socialist integration. Particular attention is being devoted to the reform of the mechanism of foreign economic relations and to new forms of production cooperation (for example, to the methodological questions of determining the efficiency of joint ventures).

The studies of the complex problems of long-range forecasting are oriented first of all toward the elaboration of the methodological bases of the formation and analysis of alternatives of socioeconomic development and methods of scenario modeling. In this direction the socioeconomic dynamics and the increase of the scientific and technical potential are being analyzed. The principles and methods of formulating scientific and technical policy for the future are being specified. The evolution of institutional forms of the economic structure is being examined.

The theme "Problem-Oriented Means of Economic Forecasting" is the leading one in the area of the study of methods and models of economic forecasting.

Even a most cursory acquaintance with the themes of the research of the Institute of Economics and Forecasting of Scientific and Technical Progress shows that it is not confining itself to the purely economic aspects of scientific and technical progress. A wide range of urgent socioeconomic problems of the development of the national economy on the basis of scientific and technical progress are being studied in interconnection. Here the problems of the prevention of negative social consequences of technological innovations, the use of the achievements of science and technology for the humanization of all social relations, and the elevation of the human personality are already being posed in the first completed works.

What are the mechanism and forms of the use of the results of the work of specialists of the Institute of Economics and Forecasting of Scientific and Technical Progress?

Our institute along with other institutions of the Economics Department of the USSR Academy of Sciences is taking part in the preparation of scientific materials for the preplanning and planning documents which are being drafted by the USSR State Planning Committee for the long-range future.

The institute is compiling forecasts of the economic, social, scientific, and technical development of the USSR, which are combined in the Comprehensive Program of Scientific and Technical Progress of the USSR for 20 Years, which is submitted by the USSR Academy of Sciences and the USSR State Committee for Science and Technology to the USSR Council of Ministers and its organs.

The Institute of Economics and Forecasting of Scientific and Technical Progress of the USSR Academy of Sciences is preparing scientific materials for three sections of the Comprehensive Program. These are the section, which is devoted to the basic problems of the socioeconomic development of the country. The means of the intensification and the increase of the efficiency of social production on the basis of the acceleration of scientific and technical progress and the development of the social

sphere are substantiated in it. Further, there is the section, which encompasses the basic directions of scientific and technical progress in the USSR national economy. Here a description of the role of scientific and technical progress as the catalyst of economic progress is given and the development of the most important technologies is forecast. And, finally, there is the section, in which the problems of the progress of science are covered (the substantiation of the main directions of scientific research and their priorities, the forecast of the resources of science, the planning and management of scientific research and development).

During 1986-1988, the institute prepared for the USSR State Planning Committee a series of scientific materials for the draft of the Concept of the Economic and Social Development of the Country for the Period to 2005. Among them are reports on the themes, factors, and structure of the development of the national economy for the 13th Five-Year Plan and the long-range future, on the economic problems of the development of science, on the basic directions of the technical modernization of the national economy, on the prospects of increasing the standard of living of the people, and on the assurance of comprehensiveness in the development of the sociocultural sphere.

The complexity and the multidimensional nature of the processes and phenomena, which are being studied at the Institute of Economics and Forecasting of Scientific and Technical Progress, are stimulating its cooperation with other scientific organizations of the integrated type. Such traditional forms as theoretical and applied science conferences, symposiums, and schools are being used in establishing contacts with them. Thus, last year scientists of the institute were the initiators of and participants in three all-union conferences: "The Management of Scientific and Technical Progress: Experience, Means of Improvement" (it was conducted jointly with the Institute of Socioeconomic Problems of the USSR Academy of Sciences),<sup>1</sup> "The Demographic Aspects of the Acceleration of Socioeconomic Development" (with the Scientific Council of the USSR Academy of Sciences "Socioeconomic Problems of Population" and the Institute of Economics of the Academy of Sciences of the Ukraine),<sup>2</sup> and "The Experience of the Integration of Science and Production of the CEMA Countries" (with the Scientific Council of the USSR Academy of Sciences for Problems of the Economic, Scientific, and Technical Cooperation of the USSR With Socialist Countries and with the Sistema Scientific Production Association).<sup>3</sup>

In the comparatively short time of the activity of the institute its associates have prepared a number of monographs. Among them let us note first of all the book of A. Anchishkin "Nauka, Tekhnika, Ekonomika" [Science, Technology, Economics] (Moscow, 1986). The author examines comprehensively and in depth the regularities of the development of science and technology and the main direction of scientific and technical progress, which form the material prerequisites of the increase of

the efficiency of social production. The peculiarities of the scientific and technical revolution under the conditions of socialism are analyzed and recommendations on the improvement of the planning of scientific and technical progress are substantiated.

Another major work of the institute is the collective monograph of S. Shatalin, V. Grebennikov, and O. Pchelintsev "Sotsialno-ekonomicheskiye problemy intensifikatsii obshchestvennogo proizvodstva" [Socio-economic Problems of the Intensification of Social Production] (Moscow, 1987). In it the place of intensification in the implementation of the strategy of the acceleration of socioeconomic development is examined; the methodology of measuring the efficiency of social production and the contribution of intensive factors to economic growth is studied. Much attention is devoted to the questions of the improvement of the relations of socialist property and the optimization of the socioeconomic mechanism of the employment of the population. The authors raise a wide range of urgent problems of the stimulation of social policy, distributive relations, and regional development.

Several individual monographs were also prepared.<sup>3</sup>

In 1986 graduate studies were commenced at the institute. Instruction in them is conducted in two specialties—"Economics, Planning, and the Organization of the Management of the National Economy" and "Economics, Planning, and the Organization of the Management of Scientific and Technical Progress."

International scientific relations of the institute are being formed. Priority is being given to cooperation with scientists of the socialist countries, which is being implemented on a multilateral and a bilateral basis. Within the special-purpose multilateral academic projects in the area of the social sciences the functions of the head organization for the forecasting and economic problems of scientific and technical progress, for the problems of the improvement of the management of scientific and technical progress, and for the forecasting of social processes have been assigned to the Institute of Economics and Forecasting of Scientific and Technical Progress. Bilateral relations have undergone the greatest development with scientists of Hungary and the CSSR.

The institute is establishing contacts with research institutions and with scientists of capitalist countries, particularly with American and Japanese scientists. At the Institute of Economics and Forecasting of Scientific and Technical Progress there is a technical center for servicing devices of the Japanese firm Tokyo Juki, where the warranty repair and postwarranty service of computer hardware are carried out and advisory assistance is given to users (more than 100 Soviet organizations).

#### Footnotes

1. See *OBSHCHESTVENNYYE NAUKI*, No 5, 1987, pp 219-226—editor's note.

2. See the report of R. Galetskaya in this issue of the journal—editor's note.

3. See the report of A. Semenov and S. Kalyuzhnyy in this issue of the journal—editor's note.

4. An article based on a chapter from this monograph entitled "The Economic Nature of Scientific Knowledge" was published in the journal *OBSHCHESTVENNYYE NAUKI* (No 3, 1987)—editor's note.

5. V.M. Konstantinov, "Modelirovaniye rosta narodnogo blagostoyaniya v narodnokhozyaystvennykh planov i prognozakh" [The Modeling of the Increase of the Well-Being of the People in National Economic Plans and Forecasts], Moscow, 1986; V.K. Faltsman, "Proizvodstvennyy potentsial SSSR. Voprosy prognozirovaniya" [The Production Potential of the USSR. Questions of Forecasting], Moscow, 1987, and others.

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#### Environmental Problems Require Reallocation of S&T Resources

18140021a Moscow PRIRODA in Russian  
No 7, Jul 88 pp 4-13

[Article by S. A. Volfson and N. S. Yenikolopov: "Thoughts on the Benefits and Harm of Chemistry"]

[Excerpts] Let us point out at the outset that chemists talk and write with pleasure about their achievements, but usually remain silent when it comes to the negative consequences of their own work. They do not even like to speak of this even in their narrow circle. It is considered all right to humorously recollect explosions and fires and how someone had inhaled something or other.

Occupational diseases? Allergy? The necessity of frequently turning down experimental work by the time they are forty because of chronic illnesses? Yes, this is all true, but it should be looked at as inevitable payment for a fascinating life in science.

But not all chemists work in science? Not everybody by this age becomes an administrator? Still there is milk, a shorter workday and at many production facilities free food and an early time period to go on pension. These are all benefits meant to compensate for excessive vocational injuriousness.

Since ancient times, work with many chemical substances has been considered harmful. Not without reason were slaves, war captives and prisoners frequently used

in these operations. Medicine became interested in vocational diseases and began to systematically study them around the beginning of our century. Ideas of vocational risk, harmful occupations and level of harmful concentrations appeared.

Preventive measures for workers employed in the chemical complex are one of the workers' achievements. And how should one deal with those who live next to dangerous production facilities and use or employ chemical products in their activities?

A sanitary inspectorate is intended to watch over their interests. Each new product, material or item undergoes special tests. Some materials are suitable for contact with and storage of food products, others are not. Some are recommended for household use, sewing of underwear and clothing, others are prohibited. The number of new products and materials is constantly changing. Our ideas of harm and usefulness of those already known are changing.

The press recently reported on the tragic events at several metallurgical plants where argon is used in large quantities.<sup>1</sup> But this is a harmless inert gas! That is what is written in all textbooks and instructions. Actually, it is harmless in small concentrations. But when this heavy gas is used on a large scale and it, colorless and odorless, fills the premises, it forces air from them, and one inhalation of it becomes fatal!

Synthetic fibers are one of the major achievements of chemistry. Their wide-scale use instead of silk or wool evoked raptures among authors of popular-science articles. But subsequently it turned out that many people wearing clothing of synthetic fibers had unpleasant sensations and allergic illnesses. In the United States, more than 25 percent of the children are sick with different kinds of allergies. The number of allergic ailments is growing precipitously throughout the entire world and in our country as well. What is the reason for this?

Medical personnel reply that this is due to wide-scale employment of synthetic medicines, detergents, air pollution and synthetic food additives. Allergies constitute the dark side of the use of chemicals in our lives. But if only they were allergies.

Chemical processes of transforming substances are linked to the absorption and release of energy, utilization of water, air, solid, liquid and gaseous mineral products and the formation of a tremendous amount of various wastes and byproducts. These wastes contaminate the earth, the water and the atmosphere. Very rarely are they harmless, considerably more often, unfortunately, harmful and dangerous. Even harmless wastes and products of our activities, accumulating in large quantities, are capable of becoming malicious turncoats. It is enough to recall the balance of carbon-dioxide gas in the atmosphere.

Diverse wastes of consumption should be added to industrial wastes. Leaks of petroleum products in the sea and coastal waters have repeatedly resulted in catastrophic consequences. Plastic refuse is contaminating the World Ocean and the land since it is not biologically degradable.

Medical personnel have introduced the concept of maximally permissible concentrations of harmful substances in air and water around industrial enterprises. These are the vaunted MPC [PDK] around which so many copies are destroyed. Norms of permissible impurities are gradually becoming more rigid, and sanitary protection zones around enterprises are being expanded. Not so long ago, within our memory, wastes were simply dumped into water bodies or transported a distance away and then thrown on heaps, buried or burned. Today fines are issued for this everywhere.

Some types of wastes have begun to be collected for processing. The number of such wastes is constantly growing. The idea emerged of building waste-free or low-waste production facilities. For economy of energy, it is proposed to develop energy-conserving processes.

In other words, the chemists are not sitting doing nothing—progress in the matter of protection of nature from the action of chemistry is seemingly at hand. What is the reason for this universal indignation?

There are several answers to this question. It is simplest of all to say that the growth of overall measures for protection of nature from the harmful action of the chemical complex is unable to keep up with the development of the chemical complex itself. The accelerated overall development of industry is to blame. A technology which was quite useful yesterday is today with mass use the source of pollution. Protective norms are becoming obsolete. It is frequently impossible to keep up with their revision. Certain threshold possibilities of nature have been overcome to accumulate and to biogenically decompose chemical products.

When a report appeared several years ago that moths have "learned" how to feed on nylon, most chemists greeted it with disappointment. Yet another attempt to develop an "everlasting" material had failed. In the light of modern ideas on ecology, this was one more defeat by nature of irrational mankind.

Industrial production facilities of gigantic size are now being created more rapidly than scientists are able to conduct basic research and to work out a scientifically valid conception of the development of this or that region. Such was the case with Lake Baykal, Kara-Bogaz-Gol and the Caspian lowlands.

The global consequences of our industrial activities in most cases turn out to be quite unexpected for engineers. They were not taught to calculate the remote results of such activity. Narrow technicism [tekhnitsizm] and the

absence of a humanitarian view of nature as something unique, departmental ambitions and the wrongly understood honor of the uniform exacerbate the state of affairs.

If passions seethe around the majority of "plans of the age," then what can one say of existing production facilities, in most cases long physically and otherwise obsolete, with which the chemical complex is so rich in? The existence of a modern, effectively operating system of purification of emissions and discharges at a chemical enterprise—is this a pattern or accident, a rule or exception to the rule? We have reliable statistics, but we all understand how difficult it is to meet the enterprise's director who is tranquil about the state of affairs relating to the protection of the environment at the plant entrusted to him.

#### Scientific and Economic Problems

Incidentally, all these passions may not concern a scientist of the academic type. Concentration and development of production have resulted in negative consequences? This is logical and law conforming. It will be necessary to increase allocations for scientific research. Theories of modeling have been developed, and qualified scientists exist. The problem of harmful emissions, wastes and discharges of chemical production facilities is theoretically solvable. It is always possible to develop a chemical, physical or biological way for their elimination, modification, neutralization or transformation into valuable products.

Such a formulation of the question will not elicit any enthusiasm in a staff member of a sectoral scientific-research institute. They, workers in applied science, definitely know that any operation with wastes and emissions is linked to the need of having additional equipment and expending additional power and materials. In any case, all this acts as a heavy burden on the production cost of the basic product, which needs to be reduced and not raised.

For those who plan, finance and locate production facilities of the chemical complex, the problem is even more acute. The criterion of economy demands maximal reduction of capital and current outlays on the creation of any production facilities. Otherwise, effectiveness is reduced, payback time periods for invested funds are lengthened and it becomes more difficult to "extricate" these funds and so forth.

Yes, in principle ways of eliminating almost all harmful production wastes exist or can be developed, but where do you get the funds for working out and developing them? Already at the present time, the share of funds expended on purifying discharges and emissions is reaching 30 percent. If we add to this everything we have not completed and all unpaid debts, then we have a tremendous sum of many tens of billions of rubles.

Even the actual formulation of such a question appears inept for many departmental specialists participating in the work. Well, one cannot seriously speak of a significant increase in production costs of the chemical complex solely because of tightening of demands relating to protection of nature. You cannot plan the expenditure of vast state funds for measures that do not provide an increase in production output.

And yet we hear on radio and television, read in papers and journals of the opinion of competent specialists: do you want to enjoy modern comforts? Do you want to have electricity and heat in the house? Do you want to read newspapers and journals, eat to satiation and walk around fashionably dressed? Resign yourself. Resign yourself to the pollution of rivers, lakes, the land and the atmosphere. Resign yourself to the destruction of wildlife, birds and fishes. Resign yourself to the diseases of the 20th century. This is inevitable. It is an objective consequence of scientific and technical progress.

#### Break the Stereotype

Sarcastic people have originated a pithy saying: chemistry or life! But let us not be in a hurry to agree, for our future and the future of our children and grandchildren has been put on the chart. Let us put emotions aside. Let us assume that we want to both conserve nature and to feed people and to provide them with clothing, energy and comfort, albeit on the level of the world standards of our time. Is this problem so unresolvable as the departmental representatives want to persuade us?

For this, we need first of all to revise certain ingrained stereotypes. Let us return to the criterion of economy. It is because of it that purification systems and "burdensome" plans are being cut to a minimum and are being built last or sometimes just remain on paper. Because of it technological regulations are frequently violated at existing production facilities and these try to economize on power and materials in purification.

Attempts are made to fight this evil, and violators are fined and educated. This helps, but not much. Incidentally, more effective measures being used abroad are known. Sensors and instruments continuously controlling the situation surrounding production are under the jurisdiction of local organs of government. Under the conditions of glasnost, we can count on these local authorities to cease "assuming the position" of heads of production facilities.

It is more difficult to radically change the psychology of personnel of planning organs. An open extradepartmental expert examination of plans is needed. It is necessary to boost in every possible way the prestige and responsibility of commissions of experts. They should involve specialists of a broad profile. It would be ideal to combine such an expert examination with competitions of plans or at least their technical and economic validations.

It might appear to be easiest of all to restructure science. But here you have in operation a rather rigid system of priorities: to prestigiously engage in a new process, a new product or a new material. Purification of sewage and utilization of wastes are much less prestigious. One often wishes for someone else to do this. But in what technological scientific-research institute do these problems occupy a dominant position? Yes, and how many have received Lenin or State prizes, orders and honorary titles for making purification equipment?

And yet it is time to give this the highest merits. It is time to put this problem in the place of highest priority. This is no joke for it is necessary to restructure most of the existing industrial technologies. It is time to restructure in this context basic science. It is time to start systematic propaganda among scientists and engineers. It is time to teach schoolchildren and students differently. On the whole, the creation of new technologies and improvement of old ones are only half the job. We need to learn to economize on water, to collect wastes and trash and to rescue each plot of land from contamination. It is necessary to inculcate a new ecological culture.

### Oppressive Leadership

Let us turn to the example of those of our neighbors who before us, due to higher development of the chemical complex, have encountered negative factors they gave rise to. Let us turn to the United States. In the past 10 years, significant changes, which have also applied to the chemical complex, have occurred there. First of all, production of pig iron and steel has been sharply curtailed and many metallurgical plants have closed down.

Over the course of many decades, we thought that the production volume of these materials determines a country's economic might. In the name of what have the Americans voluntarily ceded primacy to us?

Two convincing reasons are to be found. The first is that production and processing of metals is extremely energy-intensive. The second is that metals rust quickly despite all measures for protection against corrosion. The result is that a significant portion of produced metal goes into replacement of rust, and the more we produce metal, then proportionally the greater are the losses. Does not the chief reason for the paradox in which our industry finds itself lie in this? We produce more metal than anyone in the world, more than the United States, Japan and West Germany combined, and yet we do not have enough of it.

Of course, a negative role is played by the great metal intensiveness of equipment, irrational use and low quality of metal.

How do the United States and other developed countries find their way out of this situation? They now have relied for a long time on the development of production of plastics and structural materials. These materials require

significantly less power in their production and processing, and they age more slowly. A steel pipe can become unserviceable after 3-5 years and under especially difficult conditions within 1.5-2 years. Plastic pipes are servicable for 30-50 years or more. Polyethylene and glass-reinforced plastic withstand the most aggressive environments. In addition, polymers are significantly lighter than metals. On this basis, there is a boom in their use in aviation, motor-vehicle building and the production of other means of transport. The reduction of mass means again reduction of power consumption. Finally, processing of plastics is much cheaper than processing of metals.

We produce twice as much metal as the United States but only two-ninths of the plastics.

In the production of mineral fertilizers, we have outdistanced all the developed capitalist countries, but we have not obtained adequate yields from agriculture. It is now being proposed to accelerate the development of production of agents for protection of plants. All these substances are by no means harmless. In case of improper use, they inflict more harm than good. Chemists can fulfill the social order: develop technologies and organize production. Not without reason do we have for this an entire Ministry of Mineral Fertilizer Production. But who guarantees the effectiveness of use of these substances? The proofs are debatable and frequently unconvincing. Hurry in decisions is fraught with major oversights as has happened more than once. Actually, do we need primacy in the production of mineral fertilizers and pesticides, or would it not be better to cede it to others?

Criticism of the technical policy of the Ministry of Water Management attained tremendous scope. The water shortage in our southern regions and at the same time salinization of the soil are all the consequence of use of an obsolete technology. Canals and irrigation ditches were good in the old days. Ceramic drainage pipes are also a technology that has outlived its time. It is also high time to change over to plastic pipes, from watering to subsoil irrigation, for the useful expenditure of water in watering amounts to only several percent.

Several years ago, a number of laws were adopted in the United States pertaining to the operation of the chemical complex. For example, consumption of energy was to be reduced by 25 percent and harmful emissions into the atmosphere by 30 percent. Very likely these laws did not evoke joy in heads of chemical firms. But they had to be carried out under threat of ruinous fines and under rigid control without any sort of compensation. At the same time, the production volume of the chemical industry grew 10 percent in the last 5 years.

These are achievements of the United States. But in Western Europe, the European Parliament adopted a law according to which the use of any polymer film and plastic packing, if they are not biodegradable, will be forbidden to be used beginning with 1991. One can

imagine what despondency reigned in the camp of the producers of widely used plastics—polyethylene, polystyrene, polyvinyl chloride and others.

In a number of European countries, bonuses were introduced for sorting trash at the time it is thrown out: plastic wastes into one container, metal into another and glass into a third. A processing industry of wastes and trash is rapidly developing. Today it still seems to us that the life-support cycles developed for spaceships are something close to the fantastic. Before we know it, they will be passed on to Earth from space.

#### The Fate of Old Industrial Centers and New Technologies

These facts as well as numerous others cited in the press oblige us to think of a most stubborn conductor of traditional technical policy. But it is quickly coming to its senses. Of course, it states, when one deals with the creation and location of new production facilities, it is necessary to take into account the achievements of scientific and technical progress. And we have something to boast about. Thus the new process of synthesizing polycarbonate, a valuable structural plastic, is vitally needed for the development of our industry, and it was made with the most modern requirements.<sup>7</sup> Not without reason has a whole line been formed of foreign firms wishing to acquire it. At the same time, phosgene, a military poisonous agent of the time of World War I, is used in the production of this plastic.

We can point out personally that this material is actually very much needed, and now the greater part of it is purchased here by people from abroad. Members of the party and trade unions of the city of Ufa on whom fell the selection of plans have not provided for assurances of specialists and their guarantees in regard to improvement of protection measures. It is enough to recall the lessons of Bhopal and Chernobyl. Furthermore, the situation in the city, which is so overfull of chemical production facilities, is most depressing. The construction decision was rescinded.

But why, one asks, should it be necessary to locate a potentially dangerous production facility within the confines of the city? Many of today's problems come together as in a focus in this question. The city was selected as a place of construction according to canons which have been legal for tens of years. Here you have a site, raw materials, power, water, manpower resources and a developed infrastructure. Outlays on construction are minimal. They would be much larger in any other place in the country. Harm from production, dangerous emissions? But, pardon me, the plan provides for excellent systems of protection plus large funds for building up the adjacent area. The city would only gain (this is the planners' opinion). After all, local administrators only a year ago easily and simply signed all the documents.

Yes, indeed a year ago everything was easy and simple. The fact is that no one not on the inside knew anything about it and consequently did not interfere. But now the mistakes in planning will cost dearly.

The situation in Ufa is typical: we have about 100 old industrial centers in a comparable condition. They are in need of pressing treatment and occasionally surgical intervention. This has already happened in Yerevan where it was found necessary to close down production of synthetic rubber, which was important for the country but significantly polluted the air.

It is understandable why planners strive to locate new production facilities or intensified old ones in populated places. It is cheaper, but the people's interests are lost sight of. At one time, plants were built on the outskirts. However, the cities grew and the plants found themselves surrounded by residential blocks. Removal of chemical production even from Moscow is a most difficult problem. Let us remember how many years were spent on reshaping the Dorogomilovskiy Chemical Plant. Several plants still continue to pour smoke in Moscow.

The problem of reshaping the Shchokino Chemical Combine located next to Yasnaya Polyana is a complex one. So far they have not succeeded in solving this problem at the Kuskovskiy Chemical Plant despite the adoption of a number of measures relating to this question.

But still departments or those who may replace them will have to remove chemistry from the cities. The time has already arrived, and it is not necessary to bring this matter up to open conflicts. We need to urgently develop a state program reshaping production.

#### The New Technical Policy

Ideas on organization of modern chemical technologies have already been formulated. They have to be waste-free, or in an extremity low-waste, energy-conserving, highly efficient, integrated. The development of such technologies is a problem of exceptional complexity. We have not been accustomed, for example, to save energy—it costs pennies and little influences the production cost of chemical products. We have not made it a habit to save water for the same reason. Traditionally, we give preference to more simple and reliable solutions, although their time quite possibly has passed.

Here are two more examples from the history of polymer technology. One concerns polyformaldehyde, a structural plastic, included together with polycarbonate in the group of engineering plastics. Like polycarbonate, it was first developed in the beginning of the '60s. We in our country conducted in parallel the development of two variants of technology. One was complex, energy-intensive. Actually this was a reproduction of a foreign one. The other was original, economical but less reliable.

In selecting a variant for industrial implementation, on one side of the scale was placed the greater reliability of the process and on the other all the remaining advantages. It is not difficult to guess which of these technologies was given priority by managers of industry.

Natural gas rather than petroleum, as for the majority of other polymers, is the raw material for production of polyformaldehyde. This as well as the outstanding properties of the material drew attention to it throughout the entire world. However, due to the complexity of the technology, this plastic has not received the same dissemination up to the present time as have polyethylene, polypropylene or polystyrene.

Recently, the Japanese Asahi firm worked out a cheap, economical process for synthesizing polyformaldehyde and in a short time developed capacities of 100,000 tons a year. And this in Japan, where the market is saturated with polymers! The basis of the process consists of ideas which we developed 20 years ago.<sup>3</sup> But our process of direct synthesis from a monomer has remained on the level of an experimental industrial installation.

Even more surprising is the fate of domestic polypropylene. We possess a tremendous raw-material base for the development of production of this very valuable plastic. After all, our country was a pioneer in the development of an original and economic process of synthesis without the use of a solvent. The first industrial installation was established in the beginning of the '60s by specialists from the Institute of Chemical Physics of the USSR Academy of Sciences and technologists of the Moscow Petroleum Refining Plant.<sup>4</sup> But in this case some unfinished work and quality of the product permitted critics of the domestic technology to insist on purchasing the obsolete technology from abroad.

About 20 years passed, and leading producer firms of polypropylene adopted a technology close to the one which was worked out in our country. We have to actually restart development anew, while tremendous quantities of a most valuable raw material are burned as exhaust flames of petroleum refining plants.

In principle, everybody agrees to the fact that Soviet developers need to get a "green light." But this is in words only. In practice, the economic mechanism is structured in such a way that departments and even heads of production find it incomparably more advantageous to initiate the purchase of an imported technology in "turnkey" form so that everything is ready. In this connection risk is reduced to a minimum and the same for responsibility.

Mass purchases of a complete technology have resulted in sad consequences. Our own developments landed on the shelf, and the industry of chemical machine building began to lag catastrophically.

An incorrect understanding by certain managers of industrial of the so-called Japanese phenomenon—rapid development of the Japanese chemical complex on the basis of purchased licenses—lies at the basis of many mistakes of economic policy.

Full employment of the developments of modern technology, cooperation of efforts with foreign partners and familiarization with international experience are necessary. But by means of participation on an equal basis instead of "turnkey" purchases. Let us recall that as the result of an intelligent economic policy Japan is becoming quickly transformed from an importer of technologies into their largest exporter. And were we to compare technologies purchased by us and those sold abroad, it would be sad. The balance is not in our favor.

#### On the Method of the Carrot and the Stick

Restructuring of the chemical complex for ecologically clean processes in parallel with its accelerated development (one must not forget that despite the surplus of metal and fertilizers we are acutely in short supply of most of its products) is a tremendously complex problem. It requires not only solid capital investment but also the mobilization of scientific, engineering and worker thought, a great strain on resources, a rise in the effectiveness of science, retraining of personnel and improvement of qualifications.

An extremely uneven distribution of scientific resources among different sectors of the chemical complex has developed among us, and the proportions in the actual science have been disturbed. A shortage exists everywhere of modern instruments, office mechanization equipment, chemical agents, testing bases, laboratory and experimental technological equipment. Over the course of many years, we acquired by hook or by crook instruments and equipment for hard money instead of investing this money into the creation of our own production facilities for these instruments and equipment.

The piling up of problems can make anyone despondent, but we shall place our hopes on the healing strength of restructuring of the national economy. The awakening of a feeling of social responsibility in producers instead of economic interest as the result of their work and rather than just plan fulfillment should provide an effect.

It is very important to break down departmental isolation and to learn to concentrate scientific and engineering forces on the main directions of work. It is necessary to break the diktat of head sectoral organizations resulting in a monopolization of science.

Scientists lack information on the real state of affairs in industry. Most of it is "secreted" by departments and is accessible to an extremely limited number of people. On the other hand, heads of enterprises often simply do not know whom to turn to for help. A way out of the

situation is suggested by practice—intermediary cooperative information centers. And indeed there has been created the VNTITsentr [All-Union Scientific and Technical Information Center (?)] which could assume the functions of a chief coordinator.

Each sector has its own scientific and technical journal. However, there are few advertisements, proposals and orders in them. Foreign scientific and technical journals provide a surfeit of this information. The time has come for our journals to be obliged to fill the information vacuum. Heads of enterprises and even scientific-research institutes must have the possibility of publicly ordering developments they need regardless of departmental affiliation. Scientists, engineers and inventors should have the possibility of advertising (really advertising!) their results.

Today the channels of such information are odd: newspaper articles, popular-science journals, television programs, feuilletons, exhibits and so forth. All this is done in bits and pieces and often incompetently. The real problems of the chemical complex should be brought to each member of a multi-thousand group of scientists. Where there is no information, there can be no ideas.

Interrelations of science and production are still poorly regulated. The author's right to an invention in its modern form provokes particularly many criticisms. Deliberate restrictions, the incredible complexity of "knocking out" rewards and the practically total absence of inventors' rights—all this does not promote progress.

The possibility of a broad and free union of creative individuals and collectives continues to be held back by a mass of bureaucratic impediments. As of now we can only dream of flexible and dynamic ties of science with production. It is characteristic that the number of temporary collectives created in recent years is commensurable with the number of decrees regulating their activities.

The frequent ineffectiveness of decisions promulgated "from above" is shown by our own work experience on the creation of a technology for processing polymer wastes. The amount of these wastes is tremendous: about 1.5 million tons of tires worn out annually, 250,000 tons of wastes from plants engaged in industrial rubber products, hundreds of thousands of tons of wastes of products made from polyvinyl chloride, polyesters, polyurethanes and other plastics, synthetic fibers, textiles, and leather and several million tons of cellulose-containing materials (wastes of woodworking, crop growing and the cellulose industry). Let us compare the total volume of these materials with the annual production volume of plastics. Only an insignificant part of these synthetic and natural polymers, totaling up the large amount of power expended on their manufacture, is reprocessed. The rest is burned, buried or thrown out.

No decrees (and there have been many of them) succeeded in solving this problem until the enterprises became interested in it. But even in the presence of interest in the creation of waste-free production, an effective technology is still needed. We succeeded for the first time in proposing such a technology based on fine grinding of various polymer materials into a powder with a minimum outlay of power (so-called elastic deformation technology).<sup>3</sup> The results of the laboratory experiments conducted at the Institute of Chemical Physics of the USSR Academy of Sciences and testing work performed at several plants made a big impression on many domestic and foreign specialists.

The powders are not a final product, but by means of methods of powder technology it is possible to produce from them various materials and products. For example, a portion of the rubber powders can be used as an addition to rubber mixes. It is possible to produce from these powders composite materials, coatings, asphalt and concrete mixes with improved qualities, a liquid binder for briquetting coal, porous hoses for subsoil irrigation with whose assistance it is possible to save more than 90 percent of the water used for watering and so on.

Of course, a special technology is required each time for processing a powder into a concrete product. With intensive work it should be possible to return to industrial use in several years a tremendous amount of valuable polymer materials, which are now irrevocably lost and in addition pollute the nature around us.

We proposed this technology about 8 years ago. So far it has been introduced only at several enterprises. Why? After all the economic benefit has been proven. The answer is such: we do not have specialized equipment, there are no complete lines for processing powders. Not a single enterprise of the Ministry of Chemical Machine Building wants to engage in its development. USSR Gosnab and several ministries discussed the problem but evidently got scared because of the scale of the tasks involved and their complexity. Certain ones, for example, the Ministry of Procurement, came out categorically against it because the new technology (waste-free!) undermined the standards existing in the sector.

At the present time, our Bulgarian colleagues have become interested in the new technology. Requests and proposals are coming from foreign firms. Will it not happen again as has occurred more times than one that a domestic technology will return to us from abroad paid for generously by us with hard currency?

The chemical science and industry of our country face tremendously complex problems. Let us deal with them with all the seriousness that they deserve.

Physicians, on receiving a diploma, take the Hippocratic oath. Is it not time for chemists to take an oath of fidelity to Nature.

**Footnotes**

1. Sazonov, G. "They Did not Return Home from the Shop." // PRAVDA, 18 Feb 1988, p 6.
2. Volfson, S.A., "Osnovy sozdaniya technologicheskogo protsessa polucheniya polimerov" [Bases of Creating the Technological Process of Production of Polymers]. Moscow, 1987, p 80.
3. Ibid., pp 77-78, 164-165.
4. Ibid., p 77.
5. Enikolopian, N.S., Akopian, E.L. and Nikolsky, V.G. // "Makromol. Chem. Suppl.", 1984, Vol 6, pp 316-330; Enikolopian, N.S. //Ibid., Vol. 8, 109-117.

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**Baklanov Visits Troubled MNTK 'Rotor'**  
18140018a Moscow IZVESTIYA in Russian  
7 Aug 88 p 3

[TASS article: "More Attention to Automation"]

[Text] One of the promising directions of raising production efficiency is wide-scale introduction of rotor and rotor-conveyor lines which can equally successfully operate in machine building, in the food and medical industries in the production of consumer goods and in other sectors by provided comprehensive automation of production processes and a significant increase in labor productivity. A leading place in carrying out this work is occupied by the design bureau of automatic lines—the head enterprise of the Rotor Intersectoral Scientific and Technical Complex located in Klimovsk of Moscow Oblast. On 5 August this near-Moscow enterprise was visited by CPSU Secretary O.D. Baklanov.

Academician L.N. Koskin, the general director of the intersectoral scientific and technical complex, described the work of the complex in further expanding the use of rotor technology, developing the necessary laboratory, design and production base and developing and introducing new types of rotor lines.

The secretary of the CPSU Central Committee looked over the existing comprehensively-automated production of mass-produced items on the basis of rotor-conveyor lines and acquainted himself with examples of new equipment. Attention was drawn to the intolerably long time required for the development of this progressive equipment. The developers were subjected to sharp criticism for slow development of the work relating to creation of rotor lines and components for making one-time medical syringes so needed by health care.

In a conversation with workers and engineering and technical personnel, O.D. Baklanov displayed an interest in the progress of perestroika, how food and social problems are being solved and what is being done in the collective on fulfilling the decisions of the July CPSU CC Plenum.

In his concluding talk with management and specialists of the head design bureau, the need was stressed of a radical improvement in the work of the intersectoral scientific and technical complex on the creation and introduction of rotor and rotor-conveyor lines in the national economy. Practical measures were outlined for ensuring the fulfillment of set targets. Tasks were set for the accelerated solution of the pressing problems of the collective's social development.

B.L. Tolstykh, the deputy chairman of the USSR Council of Ministers and chairman of the USSR State Committee for Science and Technology, USSR ministers P.V. Finogenov, V.G. Kolesnikov, N.A. Panichev, V.A. Bykov and other party and economic leaders were present with O.D. Baklanov.

**Lysenko Foe Anton Zhebrak Rehabilitated**  
*18140301b Minsk SOVETSKAYA BELORUSSIYA*  
*in Russian 16 Mar 88 thru 18 Mar 88*

[Article by V. Bibikov: "Son of the Homeland: Knight of Truth". Passage in boldface as published]

[16 Mar 88 p 3]

[Text] A native of Belorussia, Anton Romanovich Zhebrak, attended courses for improving soviet and party workers in Moscow in 1919. There he was fortunate enough to hear Vladimir Ilich Lenin. Subsequently, Anton Romanovich retained his ideological inflexibility through the tempests of civil war and the 1930s-1940s, when he courageously defended the work of outstanding Soviet geneticist N.I. Vavilov in the struggle against Lysenkoism and throughout his entire life. No matter which post he found himself in (political worker on the front, student trainee in the U.S., president of the BSSR Academy of Sciences or department head in Moscow), he always remembered what it means to be a communist and the son of his native homeland.

#### A Brief Thaw

Why does A.R. Zhebrak's personality interest us? Unquestionably, this is not only because of his great scientific achievements, but also because of his role in the struggle against totalitarianism in the development of Soviet science. As everyone knows, the cult of Stalin's personality led to attempts to replace the logic of research with resolute commands. Instead of scientific arguments in a debate with one's opponents, political slander and denunciations were used, as a result of which the opponent often vanished not only from the scientific arena, but also from life. The eminent scientists N.D. Kondratyev and A.V. Chayanov were innocently defamed. N.I. Vavilov died in prison; almost every day now new names become known. "No one could be sure that something bad might not happen to him tomorrow," recalls V.K. Gorev, BSSR Academy of Sciences president from 1938 to 1947. "I was given information almost every day about which scientists had been taken away in the night as an enemy of the people."

T.D. Lysenko was one of the most skillful of those who "loved" working through these methods. Employing obsequiousness and slander, he and his associates made their way to the commanding heights in the biological and agricultural sciences and propagated their own teachings, thus setting Soviet genetics back by decades. Speculatively using the authority of the outstanding scientists Michurin and Timiryazev, Lysenko denied the existence of genes and their role in heredity, attempting to convince society that it is possible to impart desired properties, which could be reproduced in subsequent generations, via the "upbringing" of a plant or animal. If

he had managed to prove this, it would also have been possible to assert that the social environment shapes a person's consciousness, independent of the person himself.

The genetics department of the Moscow Agricultural Academy imeni K.A. Timiryazev, headed by A.R. Zhebrak since 1934, acted as a bastion in the struggle against these false ideas. It was among the first to attempt to "look inside" the organism of a plant, to reveal which part was responsible for one or another property and to learn to control them. For example, the cellular nuclei of different types of wheat contain 14, 28 or 42 chromosomes. This is the so-called polyploid series. The more chromosomes the wheat had, the higher its quality. It was natural to presume that, upon artificially increasing the number of chromosomes, one could obtain an even more valuable type of plant.

Anton Romanovich crossed wild and cultivated types of wheat, trying to combine the former's resistance to disease and bad weather and the latter's high crop yield and grain quality. However, in the same way that a mule (a hybrid between a horse and a donkey) is infertile, the mixed-species hybrid plants were also infertile. In order to obtain inheritance, the number of chromosomes in their reproductive cells had to be doubled. Anton Romanovich chose the chemical preparation colchicine for its corresponding effect on plants. Thus, he was the world's first person to obtain 56- and then 70-chromosome wheat. A small bridge had been created, across which transferring the valuable properties of wild wheat, primarily immunity to diseases and resistance to bad weather, to cultivated varieties was proposed. These were the first steps in the development of the theory of remote plant hybridization, which has been widely developed in our day. However, much work must still be done, in order to give hybrids production significance by way of selection and new crosses.

"When Anton Romanovich was made an academician of the BSSR Academy of Sciences," remarks V.K. Gorev, "he began actively conducting research in Belorussia. In the summer of 1940, he completed an expedition to the republic's western oblasts and gathered a large collection of agricultural plants in the grass family, which he then studied at the Timiryazev Academy. He began organizing a group of researchers in Minsk at the Institute for Socialist Agriculture, where he experimented with the effects of colchicine. In parallel, Zhebrak worked on the selection of existing grain culture varieties. He traveled a great deal to the kolkhozes, collected whatever plant grasses interested him, and later worked with them."

In his autobiography, Anton Romanovich himself considers the experimental work to obtain new amphiploid wheat to be the most interesting of his activities in terms of theory and practice. He was awarded the Great Silver Medal of the All-Union Agricultural Exposition in 1940. He was then made a member of the BSSR Academy of Sciences. The following was described in one of Anton

Romanovich's references: before the fascists seized Belorussia, he managed to introduce a number of very valuable local wheat populations and during the Great Patriotic War he selected and multiplied them in the fields of the Timiryazev Academy. After the republic's liberation he sent the BSSR People's Commissar of Land about three tons of the best seeds from his selection work.

Zhebrak's discoveries convincingly supported the chromosome theory of heredity, which Lysenko and his associates discredited in every possible way. Regardless of the fact that these pseudo-scientists enjoyed official protection and held many leading positions in biological science, it was impossible to leave the authority of principle-minded researchers such as A.R. Zhebrak out of consideration. In 1945-1946 Anton Romanovich had worked in the Administration of Propaganda and Agitation of the VKP(b) Central Committee. Today, it is difficult to speak in detail of his relations with Yu.A. Zhdanov, head of the Central Committee Department of Science in 1947 and son of A.A. Zhdanov, a Politburo member and Stalin's closest companion. However, there can be almost no doubt that A.R. Zhebrak did participate in forming the younger Zhdanov's view of Lysenko's teachings as pseudo-science. This also contributed to the fact that virtually all of the agronomic methods proposed by Lysenko, such as yarozization and the summer planting of potatoes, for which he predicted a decisive role in increasing agricultural productivity, collapsed ignominiously. As a result, Yu.A. Zhdanov spoke in Moscow before a large audience of propagandists and denounced Lysenko's postulates.

It seemed as though the ice had cracked. A USSR Academy of Sciences Biology Department Bureau meeting decided to establish yet another genetics institute—essentially a counterweight to the one which Lysenko headed. The work plans for the new institute were compiled by USSR Academy of Sciences Academician N.P. Dubinin, jointly with Anton Romanovich. In March 1947, Zhebrak was made president of the Belorussian Academy of Sciences and deputy chairman of the USSR Academy of Sciences Council for the Coordination of Scientific Activities.

The first meeting of the BSSR Academy of Sciences Presidium under Anton Romanovich's leadership was held 22 May. The protocol reflected the new president's decisiveness and principle-minded nature. He demanded that the academic secretaries independently solve all current problems related to the activity of academy departments.

One of the next meetings stipulated consideration of the question of the scientific growth of academy associates, for which institute directors were told to present the presidium with lists of senior scientific associates with references regarding their work and future prospects. At the next presidium meeting, Zhebrak required institute directors to improve the selection of scientific and

technical cadres and to utilize them effectively. In June, the plans for publishing activities and graduate student work were examined and scientific leaders for graduate students were approved.

It seemed as though years of fruitful work lay ahead. However, the clouds darkened. Even in 1944, the Belorussian Academy of Sciences had nominated Zhebrak as a candidate member of the Union Academy of Sciences. In a reference signed by V.K. Gorev, it was noted that he had undergone an "exceptional genetics education" at the Timiryazev Agricultural Academy and in the United States. The obtaining of amphiploid wheat-hybrids, which previously had not existed in nature, was hailed as a great discovery in botany and genetics of high practical value. One phrase in particularly important to understanding subsequent events: "One should attribute Comrade Zhebrak's exceptional persistence and highly principle-minded nature in scientific matters as one of his positive personal qualities as a scientist." However, Zhebrak was not made an academician.

"They could not choose him," states V.K. Gorev. "One day, before the war, I attended a USSR Academy of Sciences Presidium meeting. They listened to a report by Nikolay Ivanovich Vavilov on his institute's work. The hall was full. Lysenko also sat in the presidium. When the report was finished, the hall began to applaud loudly. Then the short speeches and captious questions began, the obvious purpose of which was to discredit Vavilov. As a result, most of the presidium members made a negative conclusion on his report. After all, Zhebrak was a firm supporter of Vavilov."

After the physical elimination of Nikolay Ivanovich, Zhebrak became one of the most important antagonists for Lysenko and his allies. It was impossible to confuse this excellently trained scientist with methods like yarozization or the summer planting of potatoes. Moreover, he carried definite weight in leading circles. The "people's academician," because of his natural cunning, realized quite well that this block could not be overthrown in swoops and that an appropriate social situation was required.

[17 Mar 88 p 3]

#### The Years of Tests

[Text] The postwar years were marked by new waves of repression. A contrived war began against cosmopolitanism and obsequiousness towards the West. The great Soviet physicist P.L. Kapitsa, who had worked for many years in leading European scientific centers, was unjustly defamed in 1946. A winner of the Nobel and two USSR State Prizes, twice a Hero of Socialist Labor, he was removed from the position of director of the USSR Academy of Sciences Institute of Physical Problems, which he had organized. The plenum of the USSR Union of Writers board actively exaggerated the question of

"obsequiousness toward foreigners" in June 1947. The case of professors Roskin and Klyuyev, who allegedly sent their preparations for treating cancer to the West, flared up in Moscow.

In this atmosphere, it was fairly easy to whip up a malicious hysteria surrounding the name Zhebrak. It started with an article by Anton Romanovich, printed in 1945 in the American journal SCIENCE in response to an article by the American biologist Sachs. Knowing A.R. Zhebrak's nature and his position at that time, it is impossible to presume that he sent this material to the United States without permission from rather high authorities. Indeed, it was sent, entirely officially, by an anti-fascist committee of Soviet scientists. Nevertheless, the fact of publication itself and the letter's contents were held against Zhebrak.

The first shot was fired on 6 March 1947: in LENIN-GRADSKAYA PRAVDA Lysenko's minion Prezent tried slinging mud at A.R. Zhebrak. However, the caliber was small and the external conditions had, apparently, still not ripened. However, on 30 August LITERATURNAYA GAZETA accused the scientist of a lack of pride and joy in our achievements. It alleged that he sided with the most reactionary American professors in his evaluation of the Soviet Michurin school, headed by T. Lysenko, and was obsequious toward foreign science. Two days later PRAVDA printed a crushing article: "Anti-Patriotic Actions in the Name of 'Scientific' Criticism." Phrases like "blinded by bourgeois prejudices and a contemptible obsequiousness toward bourgeois science, he supports a camp inimical to us" should simply have determined not the scientific—this did not particularly interest the authors—but the political portrait of A.R. Zhebrak.

This evaluation was interpreted as a sentence in the local areas. The BSSR Academy of Sciences general party meeting was prolonged for 2 days, while the "anti-patriotic acts" of President A.R. Zhebrak were investigated. Protocol preserved its "color." Shlossberg, senior scientific associate: "A. Zhebrak appeals for support of the worship of bourgeois science." Professor Zamyatkin: "Zhebrak's article is a path of dishonest struggle." Zheleznov: "The field for discussion was so broad in our country that it is completely incomprehensible, why Zhebrak turned to an American journal," etc.

The hypocrites practiced their malignant gossip without having read Zhebrak's article. Perhaps they were unaware of how the "discussion" with Lysenko or N.I. Vavilov and many of his companions ended? Hardly. However, they were from another camp, one in which scientific data had been replaced by "denunciation" type methods and statements, as one of the speakers had objected at the very same party meeting. On 16 October, the BSSR Academy of Sciences Presidium at an expanded session considered the matter of the "anti-patriotic acts of the President of the BSSR Academy of Sciences, Professor A.R. Zhebrak."

How did the scientists behave at this trial? Alas, the stenograph was not preserved. However, the fact that he did not lose his dignity and did not reject the truth is unquestionable. Heedless of the scientist's arguments, the presidium deemed his "misdemeanor" to be incompatible with holding the position of Academy of Sciences president.

The USSR Higher School Court of Honor, which A.R. Zhebrak was subjected to on 22 November 1947, also followed the same scenario. This measure differed little from a real court in form, except that the "condemned" could interact with the audience and the "punishment" was social. The meeting was held at the Polytechnical Museum in Moscow and attended by many people. Even Mariya Dmitriyevna Sedova, who had worked with Anton Romanovich as a laboratory assistant since 1934, came.

"He had endured a great deal," she relates, "but his appearance did not show it. He behaved well, with dignity. His defense was brilliantly constructed, but the accusers would have nothing to do with the facts. Some frankly tried to slander Anton Romanovich and asked humiliating questions. He left the hall with his head held high, but afterwards fell ill."

It would not do to drag the slander heard at that "court" out into the light after years, but one "pearl" evokes particular cynicism: Zhebrak had allegedly failed to fulfill his patriotic duty by not stating in a full voice that freedom of scientific creativity is the inalienable essence of the Soviet system and the socialist state. However, how could an honest person write such a thing at a time when many of his colleagues had been groundlessly repressed? A.R. Zhebrak had not encroached upon the honor of Soviet science, but had tried to show the true face of the pseudo-scientist Lysenko. He had asserted that Lysenko's theory is not yet all of Soviet biological science, which was developing, in spite of everything, within the framework of world biology.

Meanwhile, Lysenko, "improving" on Darwin, declared that the plants and animals of one species do not compete, but that mutual assistance exists among them. This was backed by mighty goal, not so much of a scientific, as of a conjectural nature. It was impossible to scientifically substantiate this postulate in practice, for which reason Lysenko again replaced scientific arguments with political labels. He equated biologists who advocated the chromosomal theory of heredity to bourgeois scientists, and "bourgeois biological science, essentially because it is bourgeois, cannot make a discovery based on the thesis, unacknowledged by it, of the lack of intra-species competition." Supposedly, this cannot be, because it can never be. Lysenko stated in a LITERATURNAYA GAZETA interview: "Some of our biologists still recognize intra-species competition. I would attribute this to bourgeois vestiges."

From these stances, preparation began for the August 1948 session of the All-Union Agricultural Academy, which went down in the history of Soviet science as a crushing defeat for genetics. The session was readied in secret from the opponents of Lysenkoist maxims, and until the last day not even the USSR Academy of Sciences president knew about it. The question of the situation in biology was raised point-blank. Having secured support "from above," the "people's academician" slashed straight from the shoulder: the history of biological science is an arena of the ideological struggle. N.I. Nuzhdin, his satrap, was more specific: Menshevist idealism has found clear manifestation in genetics. There is no scientific creative discussion, but there is cliquishness and a struggle, which adopts the most abnormal and worthless forms. Frightening words in those days.

However, Zhebrak did not change his views one iota. At the session, with utmost restraint, he told about crossing different types of wheat and making hybrids fertile by doubling the chromosomes. He was rudely interrupted and reproached for the low fertility of the cultures which had been obtained. As before, Anton Romanovich was calm. He cited data: whereas the first generation of hybrids had extremely low fertility, by the fifth generation there were plants which yielded more than 1,500 seeds. He spoke of the direct tie between these achievements and the chromosomal theory of heredity, since the fertility increase is directly proportional to the restoration of the paired nature of chromosomes. This was successfully achieved by using colchicine, which affects the basis of heredity. Zhebrak was working at the same time to find new varieties according to the classical system. It turned out that in many ways they were inferior to his polyploid type plants.

Zhebrak was not alone. Using the polyploid methods, it is possible to reproduce species, created over the course of a great deal of time in nature, explained doctor of biological sciences I.A. Rapoport. Lysenko's supporters genuinely obstructed V.S. Nemchinov, rector of the Timiryazev Agricultural Academy, BSSR Academy of Sciences academician. Literally forcing his way through provocative retorts and accusations, he declared: "...the chromosomal theory of heredity has gone into the golden fund of the science of mankind... It is inadmissible to hide the work of Professor Zhebrak at the Timiryazev Academy..." Several other prominent scientists also supported the chromosomal theory of heredity.

Suddenly, out of the blue, Academicians P.M. Zhukovskiy, S.I. Alikhanyan and Professor I.M. Polyakov retracted their previous realistic statements. In his closing address, Lysenko stated that the party Central Committee had examined and approved his report. Even Yu.A. Zhdanov publicly refuted his criticism of Lysenko in PRAVDA. Under these conditions, insisting on the former position was synonymous with jeopardizing not only one's scientific career but also one's freedom, and even one's life. A profoundly party man, Anton Romanovich was unable to oppose the Central Committee's

positions, which he stated in an address printed in PRAVDA. However, in this regard, he also did not even think of abandoning scientific principles. This is precisely what his "critics" noted.

A meeting of the BSSR Academy of Sciences Presidium was held, chaired by President N.I. Grashchenkov, on 19 August at which the VASKhNIL speeches of A.R. Zhebrak and V.S. Nemchinov and the first letter to PRAVDA were discussed. The resolution, the authors of which were not timid with their statements, deemed the conduct of the two scientists unworthy. A.R. Zhebrak was reproached for being burdened "with the rubbish of the Weismann-Morgan-Mendelev ideology, ...for failing to find the courage to directly and openly disassociate himself from the ideas of his reactionary teachers and attempting to shield himself with the letter to PRAVDA and to represent his fruitless work as an achievement." Allegedly, he had not justified his membership in the BSSR Academy of Sciences. A tendentiously selected commission was rapidly created to verify the work of A.R. Zhebrak's laboratory.

Attempting somehow to ensure the continuation of his research, A.R. Zhebrak sent telegrams to the BSSR Academy of Sciences Presidium. In one, he asked about finding a hectare of land for planting winter wheat. In the second, he assured the presidium that entirely frankly he would guarantee the restructuring of his scientific work in accordance with the teachings of Timiryazev, Michurin and Williams. Lysenko's name was not given, but Zhebrak had no previous dispute with the methods of Michurin and Timiryazev.

However, the BSSR Academy of Sciences Presidium resolved on 30 August to halt work under the leadership of A.R. Zhebrak as fruitless and proceeding from reactionary idealistic theory. Zhebrak was removed from the position of senior scientific associate and expelled from scientific councils at the institutes of botany and socialist agriculture. The presidium ordered him to return the seed material, which he had taken to Moscow in order to continue his research, and deemed its previous decision to assist him in these studies erroneous. Where Zhebrak was to reform his work methods, as the presidium demanded of him, remained unclear. At the time, he had been removed from the leadership of the genetics department at the Timiryazev Academy, and the new department head was none other than Lysenko himself. The seed material which Zhebrak had worked on, according to witnesses, was destroyed.

It seemed to be a complete defeat. V.S. Nemchinov was replaced as rector of the Timiryazev Academy by Stol'tsov, a true Lysenkoist. An expanded meeting of the USSR Academy of Sciences Presidium supported the conclusions of the August VASKhNIL session regarding the need to radically restructure scientific research work in the field of biology. The question of creating a new genetics institute within the framework of the academy was deemed erroneous. N.P. Dubinin, who had defended

Zhebrak at the court of honor in the polytechnical museum, remained virtually without work, since his laboratory had been abolished. In all, some 3,000 teachers and researchers were persecuted for their scientific convictions.

"It was very difficult for Anton Romanovich to leave the Timiryazev Academy," recalls M.D. Sedova, "but he was not broken. For some time, he conducted experiments with polyploids on his own balcony."

In spite of everything, Zhebrak worked.

[18 Mar 88 p 3]

### Nonetheless It Turns Around!

[Text] Anton Romanovich was unable to deny his beliefs. His nature was too wholehearted. Witnesses relate that after the August VASKhNIL session, when it seemed like the true scientists and biologists had been beaten, the Zhebrak home became a refuge for those who did not want to reconcile themselves to the victory of the pseudo-scientists, who sacredly believed in their rightness. I.A. Rapoport and other great specialists were there. Matters were not restricted to conversation. They wrote letters to higher authorities, in which they revealed their impatience with the then-existing situation. These people realized what was going on. A suitcase with a change of clothing always stood at the ready in Anton Romanovich's office.

He endured the absence from fully valuable research work worst of all. From 1948-1949 he was a professor at the Moscow Forest Technical Institute, and as of 1949 became a department head at the Moscow Pharmacological Institute. Only in 1953 was he granted the position of senior scientific associate in the BSSR Academy of Sciences. It was not easy to work in a place where not long ago he had nearly been branded an enemy of the people. "However, he did not break down," recalls V.Ye. Bormotov, BSSR Academy of Sciences corresponding member, "he was rock hard in his scientific principles. One day, I, still a young communist at the time, happened to attend a party meeting where someone tried once again to make up a lot of nonsense about Zhebrak. He rebuffed these attacks with great dignity."

The persecutions were not limited to petty attacks. Zhebrak was released from the BSSR Academy of Sciences under the pretense that he was not participating in its work and he ceased receiving a stipend for the title of Academician of the BSSR Academy of Sciences. Possibly, he was strict in his interactions and not very accessible because of this attitude. As he spoke, so he did. However, he loved to listen at leisure to his coworkers' reports on their work and persistently continued his studies, employing even the slightest opportunity. "As soon as the debates around his name quieted down,

Zhebrak went to Belorussia," recalls K.V. Gorev. "He started working with buckwheat and planted glades in the botanical garden with it. However, his strength had already been sapped."

In 1957 Anton Romanovich was included at half-wage as head of the polyploid laboratory at the BSSR Academy of Sciences Institute of Biology. Then his book "*Polyploidnyye Vidy Pshenits'* [Polyploid Species of Wheat] was published in Moscow, which summed up the results of many observations. He gained world fame. It is symbolic that he felt it necessary to put "BSSR Academy of Sciences" on the cover.

Anton Romanovich dreamed of returning to his alma mater, the Timiryazev Academy. It is difficult to say what this person, restrained in displaying his emotions, felt when he walked past the glory-covered buildings, the numerous bas-reliefs and monuments to those who, working here, had led Russian and then Soviet agricultural science to leading positions. Of course, he could not forget that he had left here for the civil war, and had studied, taught and carried out his most important research here.

In 1954 A.R. Zhebrak was chosen for the position of botany department head, however even then Lysenko supporters were in the majority. This politician from science managed to remain afloat even when the cult of Stalin's personality had been severely condemned. However, in 1965 the "i" was definitely dotted. Zhebrak taught a lecture course in the Timiryazev Academy. He had sent a letter to the CPSU Central Committee requesting that he be returned there for teaching and research work. The scales had tipped decisively in his favor. However, suddenly his heart stopped.

One could ask: why stir up matters from days long gone? Moreover, the name of Anton Romanovich Zhebrak as a communist, a scientist and simply a person does not need rehabilitation.

True. There is a large portrait of Anton Romanovich at the Timiryazev Agricultural Academy in the laboratory where he had held experiments and classes with his students. The scientist's contribution to the development of genetics is reflected in the lectures and his works occupy a well-deserved place in the library. However, the consequences of Lysenkoism, against which Zhebrak struggled so uncompromisingly, have still not been finally overcome.

Yu.B. Konovalov had studied at the Timiryazev Academy in the same troubled days when Lysenko had succeeded in temporarily holding his victory. Today Yuriy Borisovich is a professor and heads the department for genetics and selection of cereal cultures at the academy. Here is his opinion:

"Our generation of specialists was deprived of its fair share of knowledge. Genetics was essentially not taught as a science, the so-called agrobioLOGY—several science-like dogmas—had replaced it. This caused a simplified approach to agricultural problems. Meanwhile, Lysenkoists stood virtually beyond criticism. As a result of their leadership, there were absurd claims, such as that cabbage gives rise to rape, and fir trees—to pine. Subsequently, the agrotechnical methods proposed by Lysenko were tested in state varietal testing plots, and the advantages ascribed to them were not confirmed. However, time had passed. To this day, we lag seriously behind in genetic engineering, molecular genetics and biotechnology."

The influence of Lysenko's "idea" reached agrochemistry and animal husbandry. Like the "ban" that he had set up for the supporters of the gene theory of heredity, a reprisal occurred in physiological science as well. Cybernetics was forbidden entirely. Much documented evidence of these scientific dramas has been preserved in archives. These are scars which still cause pain.

The life and work of Anton Romanovich Zhebrak is interesting not only as a fact in the history of science. Today, they also appeal for the struggle against stagnation, routine and injustice.

#### Obituary of V. A. Belitser

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[Obituary of Vladimir Aleksandrovich Belitser, by the UkSSR Academy of Sciences Presidium, the UkSSR Academy of Sciences Department of Biochemistry, Physiology and Theoretical Medicine, and the UkSSR Academy of Sciences Institute of Biochemistry imeni A.V. Palladin]

[Text] The outstanding Soviet biochemist, honored worker of science of the UkSSR, UkSSR State Prize winner and UkSSR Academy of Sciences Academician Vladimir Aleksandrovich Belitser died 4 March 1988, after a serious illness, at the age of 82.

V.A. Belitser was born 30 September 1906 in the city of Ryazan. After graduating from the biology department of Moscow State University's Physical-Mathematical Department in 1930, he worked as an assistant at Moscow Medical Institute No 2, as a scientific associate, and then as a laboratory head at the All-Union Institute for Experimental Medicine.

From 1944 to the end of his days, V.A. Belitser worked at the UkrSSR Academy of Sciences Institute of Biochemistry imeni A.V. Palladin, heading the section on protein structure and function. As of 1964, he was deputy director in charge of scientific work and then director of this institute.

His works, devoted to the study of energy conversion within the cell and bringing to light the oxidation-reduction reaction mechanisms in cellular respiration, are an outstanding contribution to domestic biochemistry. V.A. Belitser's authority in this field was recognized by world science. The scientific research activity of V.A. Belitser has received extensive recognition from Soviet and foreign specialists. The results of his development work have found reflection in more than 200 scientific works.

V.A. Belitser devoted great attention to the training of highly-skilled cadres. Thirty-six candidates and five doctors of science have been trained under his leadership.

V.A. Belitser successfully combined his creative and scientific-organizational activity with social work. He was a member of the scientific council on the problem of the "Biochemistry of Animals and Man," editor of the international journal ISSLEDOVANIYE TROMBOZOVO [Thrombosis Research], and an editorial board member of UKRAINSKIY BIOKhimICHESKIY ZHURNAL.

His selfless labor has been marked by high state awards—the orders of Lenin, of the October Revolution, the Labor Red Banner, Friendship of the Peoples, and many medals.

The bright memory of Vladimir Aleksandrovich Belitser will always be preserved in the hearts of those who knew him and worked with him.

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11 Jan 89

